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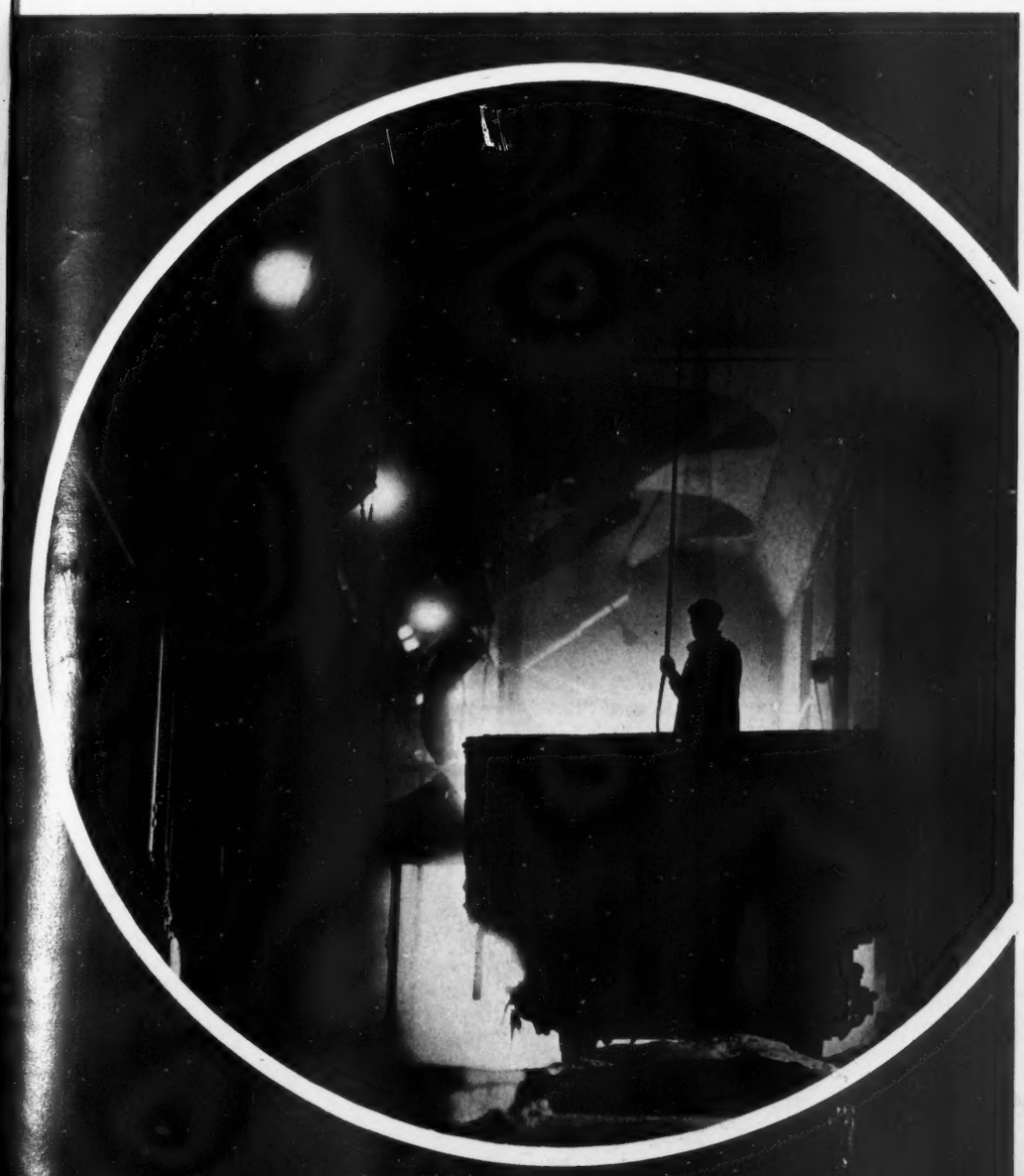
FOOD INDUSTRIES

● FOR THOSE WHO CONTROL QUALITY THROUGH MANAGEMENT AND PRODUCTION



DECEMBER 1942

Food Plants Convert To Handle War Jobs

The Microscope Reveals Facts About Dehydration

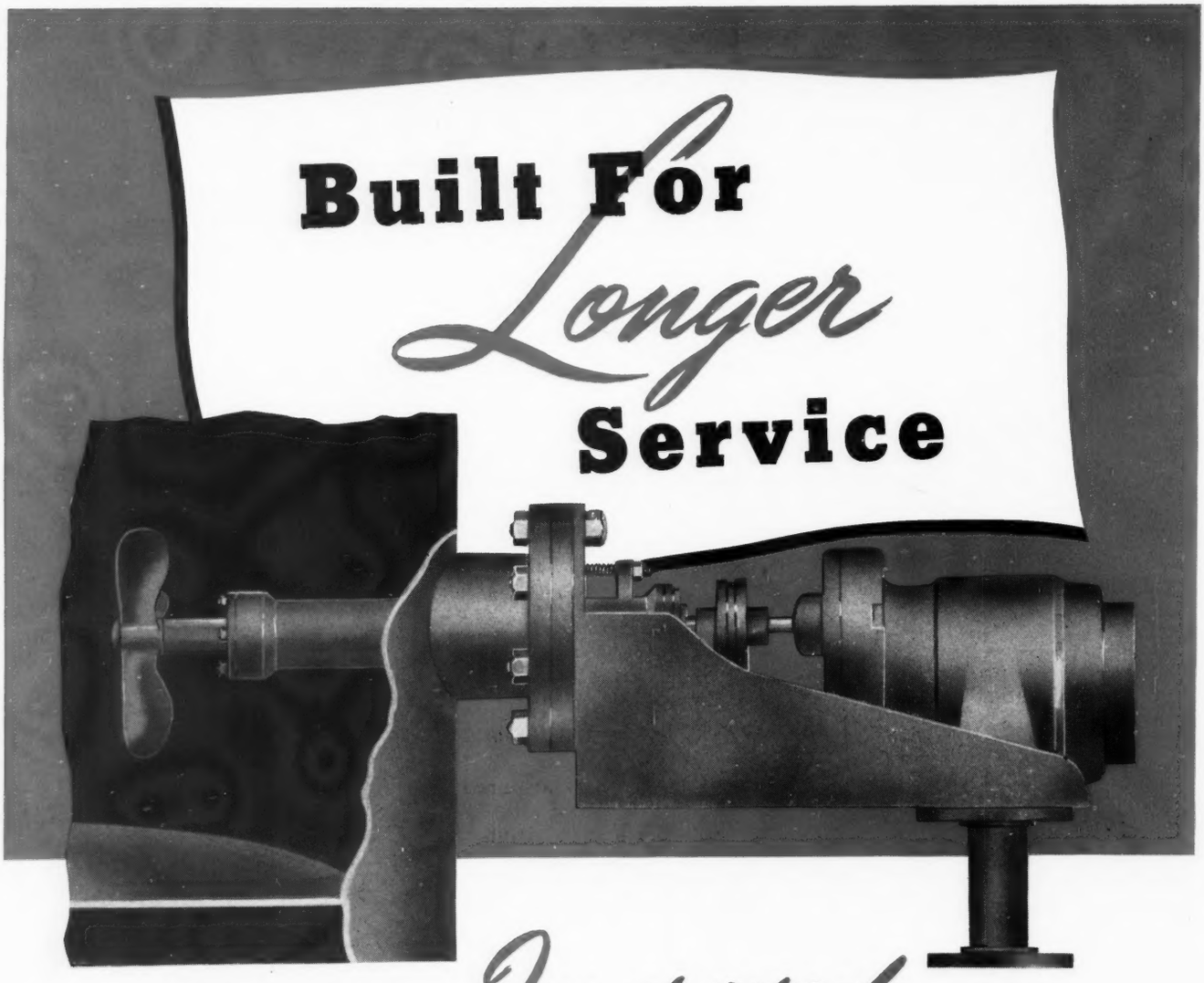
24 Ways To Improve Dehydration

Chemists Adapt Pectin To New Uses

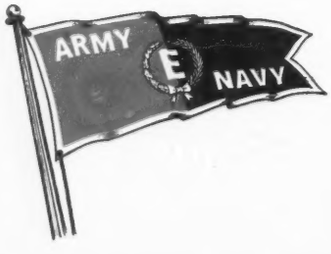
New Sweetener Made From Apples

War Forces Progress In Food Processing

A McGRAW-HILL PUBLICATIO



the new *Improved* PORTER Side Entering Agitator



★ The new improved side-entering agitator built by H. K. Porter Company, Inc., is constructed to give thorough agitation and long service for the process industries.

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Write for Bulletin SE-100 which gives complete details about this Porter Side Entering Agitator.

H. K. PORTER COMPANY, INC.

PITTSBURGH PENNSYLVANIA

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THE COVER

What the inside of a huge grain elevator looks like is illustrated on the cover and reproduced above. The interesting scene was caught by the camera of Charles Phelps Cushing, well-known commercial photographer. The car is ready to take on a load of wheat. As the man pulls the rope grain will flow through chutes and into the car. This picture was taken in a grain elevator in Montreal, Canada.

FOOD INDUSTRIES

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This Issue

Two Dozen Better Ways

You would be surprised if you could see some of the things being done by otherwise intelligent people in some of the dehydrating plants between New York and California. Our editor, L. V. Burton, was surprised, too, so much so that he listed the things that he saw done wrongly in a recent tour of dehydrating plants. And you will find these in his article, "24 Ways To Improve Vegetable Dehydration," on page 40. Unless mistakes such as those discussed by Dr. Burton are corrected before dehydrated vegetables go on the domestic market in some volume next year, you might just as well hang a crepe on the vegetable dehydrating industry now.

Microscope Reveals New Facts

"What goes there?" should always be the challenge of the food technologist to processing problems worked out by trial and error methods. He should scientifically determine why something works and something else doesn't, then he opens the door for further improvement. "What goes there?" in vegetable dehydration has been studied under the revealing lens of the microscope and is clarified by magnifications up to 600 diameters in the article by R. M. Reeve on page 51. The author made his investigations at the Western Regional Research Laboratory.

Now You Have Apple Sugar

One of the interesting new discoveries made at the Eastern Regional Research Laboratory is that you can make a sweetener from juice-grade apples. Furthermore, the apple sugar sirup is very sweet, bland and with no distinctive color or flavor to complicate its use. And it can be produced by a simple process. The characteristics of the new sweetener as a raw material and complete information on how to make it, including a flow sheet, are given in an article on page 62.

Pectin Molecule Remodeled

Pectin has been adapted to new uses. This was done by food chemists who concluded that natural pectin is a "macromolecule," a very large molecule built up of a series of simpler units in a chain-like structure which can be manipulated to give the product new and useful characteristics. It's all explained in an article starting in this issue, on page 57. The authors are Charles W. Kaufman, Ellis R. Fehlberg and Aksel G. Olsen, of the large Central Laboratories of General Foods Corp., at Hoboken, N. J.

Coming

Peeling Potatoes With Lye

Potato peeling is notorious as a wasteful and laborious operation. Even abrasion and most lye peeling methods involve much waste. But tests made with a strong lye solution indicate that losses can be as low as 3 percent. This discovery comes at an appropriate time, what with the enormous tonnage of potatoes to be peeled for dehydration. The method will be described in the January issue by L. Charles Mazzola.

Be Sure It's Not Hay

"It's not hay" is an expression long used to indicate value. And nothing could be more appropriate for indicating the quality of dehydrated vegetables. When vegetables are not properly blanched to kill the enzymes prior to dehydration, hay-like off-flavors develop. So the importance of adequate blanching is evident. One method advocated for determining whether or not the enzymes have been killed is to test for peroxidase activity. How this is done and how to interpret the results will be told in an article by H. J. Phaff and M. A. Joslyn, of the University of California.

Giving Cheese the Quick Cure

Food processing, like everything else, will have to be speeded more and more to keep up with the rising tempo of the United Nations war activities. The curing of cheese, for so long a leisurely process, may have to be done faster. And it can be, by producing cheeses of the quick-curing types. Fortunately, J. C. Marquardt, of the New York State Agricultural Experiment Station, became very familiar with many of the quick-curing varieties of cheese when in Europe six years ago. And he has written an article which gives practical directions for making these varieties. Some are easy.

Quince Seed and the War

Research has always paid big dividends, but never bigger than during the defense of democracy in this technological war. Sometimes it gives us a new and more powerful weapon, sometimes something less spectacular, like a substitute for a scarce material. In the latter category is the discovery that extract of quince seed is effective as a stabilizer for dairy products. This is significant because of a drying up of the sources of supply for gums and alginates. Gideon Hadary will tell about it in the January issue. He is an industrial fellow at the University of Wisconsin, and he did the research on quince seed.

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FOOD INDUSTRIES

FOR THOSE WHO CONTROL QUALITY THROUGH MANAGEMENT AND PRODUCTION

LAURENCE V. BURTON, Editor DECEMBER, 1942

THE FOOD MESS

SORRY days are ahead—needlessly sorry—just because our government has been toying so long with the food problems of the nation. It would not be so bad if only we ourselves were concerned. But we are in the position where we are not only the arsenal of democracy, we must be the commissary of democracy. And now it appears that we are also going to be the army of democracy.

Unless we can continue to make up the food deficiencies of Great Britain and Russia, we must face the plain fact that the United States may ultimately fight the three Axis nations unaided.

Food will *not* win the war, the statements of the Secretary of Agriculture to the contrary notwithstanding. Food will help win the war. Killing Nazis, Fascists and Japs—nothing else but killing them by the million—will win the war.

Hunger, however, can lose the war. Never forget that. Anything that we fail to do to keep up the United Nations' food supply, especially the processed, protective foods, will decrease the fighting abilities of our Allies.

The Food Requirements Committee under the present Secretary of Agriculture has failed to cope with the problem. This failure has been so awful that the problem has been put up to the President to solve. The recommended solution was a Food Administrator. To any nonpolitical realist this is the simple and direct way to meet the problems of the rapidly growing food mess. Unfortunately, however, politically minded unrealists seem to dominate the scene.

Though there is the possibility that Presidential action may be taken before these words can be printed, it must be pointed out that each month of delay in coming to grips with the food problem increases manyfold the difficulties of attaining a solution that is workable.

Food is a part of life itself. In normal times about one-fourth of our population is required to produce, process and distribute the food of this nation. We do not build up vast stores of food. A man may accumulate enough monetary wealth to last his family's lifetime, but no man ever saved up enough food to last out a corresponding period. Foods must be produced every year, every season, and some, every day.

Yet we find dairy farms closing up, dairy cows going to slaughter because of manpower shortage and inability of dairy farmers to get labor-saving machinery. Truck crop growers are notifying processors that in 1943 they will not be able to produce "stoop" crops because of labor shortage. Adverse weather has curtailed some needed crops in 1942.

Processors are unable to get equipment promptly to build up facilities for increased preservation of perishables. Transportation facilities are creaking, may become completely overburdened in 1943. Yet without such rapid transportation how can the so-called unprocessed Victory Specials be moved from farm to consumer in unprocessed form?

A flock of independent agencies in Washington have their say about the food of the nation. They act, often quite independently, as they see the needs of the situation. Machinery is obtained only after one branch of WPB has its say. Packaging supplies come under another branch. Labor comes under War Manpower Commission. Truck tires may be available only after another agency has granted them. OPA says what may or may not be paid, but Labor says what it must be paid for wages. Aircraft and ship-building are siphoning off intelligent and capable workers at wages which, indirectly, OPA says by its price controls must not be met.

One could go on at length. But the case could not be made clearer than it is now; namely, the Food Administrator's first job is to correlate, integrate and eliminate overlap of authority over food production, processing and distribution. The man who handles this job must be given authority over at least two cabinet officers and several independent agencies.

Every day of delay in setting up a Food Administration means that the problems will be much more difficult to solve. Rationing is here. Hunger can be here in 1943 unless action is taken now.

L. V. Burton EDITOR

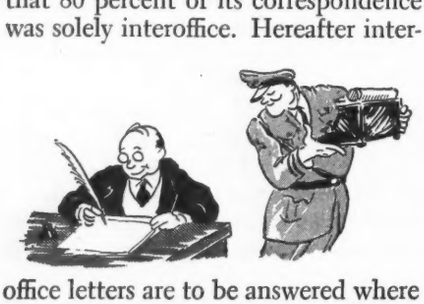
The Talk of the Industry

● THIS is the first year since this magazine has been in existence when there have been no requests (up to mid-November) for a review and forecast of the food business. Maybe those who ask for forecasts realize that 1943 will be a fairly busy year.

● A PAPER shortage is due in 1943. This time it is a shortage of white paper because of the scarcity of lumberjacks in the northern forests. There is, however, no shortage of waste paper —yet. Shipping containers should be relatively easy for a moderate time.

● SHORTAGE of lumberjacks as well as construction demand makes for the current tightness in lumber as well as for the foreseeable shortage of paper.

● SWIFT & Co., we learn via Washington, has turned over to the armed forces 38 percent of its typewriters. This generous move was made after a survey by the company revealed that 80 percent of its correspondence was solely interoffice. Hereafter inter-



office letters are to be answered where possible by longhand on the bottom or back of the original, and all letters are to be shorter. Looks like good penmanship would again be in demand.

The armed forces still want 600,000 typewriters, notwithstanding.

● IN the 1921-1922 depression Henry Ford found that "the surest way of kidding one's self" is by interoffice correspondence. He insisted that nearly all interoffice communication could be done by telephone. Which is okay when you can get the telephones.

● CONVERSATIONS overheard in Washington restaurants between November 4 and 10 are said to be very revealing of acute anguish. One doubts, however, if the anguish of the smart aleck young lawyers was sufficient to bring about a change for the better.

An Appreciation Of the Engineer

For the first time in the experience of most food manufacturers, dehydrators are up against problems of production and plant design where previous experience is nonexistent. And for the first time in the food industry the engineer has been recognized as a vital factor. Operating executives who are not well grounded in the science of physics—especially that branch of physics known as psychrometry—or who are not trained as engineers are finding themselves at a disadvantage when they face dehydration problems for which there are no precedents.

An engineer has sometimes been called a man who can reach the correct conclusion from insufficient and often inaccurate data. It has been something of a surprise in the present dehydration emergency to observe how the engineer type of food technologist is forging ahead of his more scientific colleagues in creating signal advances in the art of dehydration.

This is not to disparage the scientific man, but to encourage management to utilize every facility for rapid progress in the expanding dehydrated food industry. The well rounded food technologist understands this need, for he combines training in the fundamental sciences of chemistry, biochemistry, bacteriology and physics with process engineering.

Both the chemist and the engineer have their indispensable functions. But to employ one without the other in the dehydration field is to forget to punch with the left.

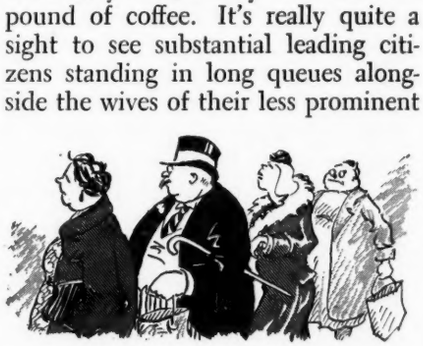
No Policy on Saving Critical Metals?

Apparently the Container Branch of WPB has no policy on the metal situation except to deny all comers as much as possible. This, it would seem, is a serious omission and deserving of instant correction. At the recent meeting of the Packaging Institute, the question was raised before the members of the Container Branch as to how many tons of steel should be saved before the board would permit the expenditure of a ton of steel to effect that saving.

Even a 20-to-1 saving of the critical metal would not bring about an approval for the utilization of the ton of metal that would bring back 19 tons for other purposes.

WPB should have a policy on this, and should announce it to encourage the conservation of metals by the use of alternate processes.

● LONG before coffee rationing came into existence people began to stand in line waiting for stores to open so that they could buy the coveted pound of coffee. It's really quite a sight to see substantial leading citizens standing in long queues alongside the wives of their less prominent



compatriots, each hoping that the diminutive supply will hold out until his or her turn comes.

● THE most important effect of coffee rationing is that a lot of us are getting hitherto unknown brands and blends, asking no questions, and glad to get the strange brands.

It is really surprising how good an unfamiliar brand may be. Perhaps it's because there is no chance for any coffee to become stale in the trade under current conditions, for coffee is at its best immediately after roasting. But farsighted executives are wondering about the cost of regaining their relative position in public esteem when the shipping situation becomes less acute—or when the shooting is over.

Compliments to Beech-Nut Packing Co.

When a large food company opens its doors to a large group of manufacturers as did Beech-Nut Packing Co. for the benefit of the Eastern School of Dehydration, conducted by U. S. Department of Agriculture at Rochester, N. Y., such generosity should not go unnoticed. Beech-Nut's execu-

tives deserve everyone's compliments and praise for the willing cooperation they have exhibited in aiding the rapid progress of the dehydrated food industry.

Not only did this afford all the "students" of dehydration a splendid opportunity to see a well-engineered operation, it also was an inspiration to all who saw, for Beech-Nut does all things well—or not at all.

Action in Africa To Increase Our Food Problems

Outside of the purely military aspects of the U. S. invasion of Africa, important repercussions on our food economy are to be expected when, as and if the Nazis are later driven out of Africa, Sicily, Sardinia, Corsica, Crete, the Dodecanese Islands, and Italy is well occupied. This will clear up the Mediterranean Sea.

Free passage of Allied shipping through the Mediterranean will more than double our Allied cargo carrying capacity by notably shortening the run from Allied ports to Alexandria, Suez and Red Sea ports instead of the long run around Cape of Good Hope. Superficial conjecture would make it likely that we would be able to get cocoa beans from Africa, coffee from South America and sugar from the West Indies as a result of release of all the long-haul shipping. But closer analysis will spoil many such happy thoughts.

Huge stocks of munitions and food must be piled up in many an African base. Many more troops must be taken overseas. Fighter airplanes in endless numbers must be delivered to our forces. All this takes ships—lots of ships.

Yet this is not all of the new burden on our shipping. As long as we have an expeditionary force over there it must be continually supplied from this continent. If we move into Italy we shall have the responsibility of letting them starve or feeding them. We'll probably give them food—not our best food—but something that will keep them alive after a fashion. Italy has almost no coal, which will put the choice up to us to let them freeze or give them some fuel.

But when we move into Greece our responsibilities really will multiply for there should be no limit to what we will do to feed the starving Greeks.

Without speculating further, the picture of the next six to eight months is one of so terrific an increase in the shipping burden that it seems unlikely that we shall be able to spare enough shipping in 1943 to bring back many cargoes from any African ports save those easily available on the Mediterranean.

Accordingly it would be unwise to plan on increased imports of vanilla, sugar, cocoa or coffee. We can, however, look for a moderate improvement in our cork imports.

Yet we must all realize that the demands on the Western Hemisphere, especially North America, for foods will be an enormous drain on our food resources as our armies really get into action. Every bit of enemy territory occupied means further demands on us for food. Every ton of shipping that is added to our merchant fleet means just that much more food to go overseas to satisfy a limitless demand. Rationing is already here, but we haven't seen anything yet.

Prepare Now For Acute Labor Shortages

Labor scarcity, becoming ever more acute, will force every manufacturer to the utmost to keep up the required production despite shortage of help and scant hope of getting any labor-saving machinery. In attempting to cope with the worsening situation it is advisable to give heed to War Manpower Commission suggestions for analyzing any given job to see if it can be done better, more easily or more rapidly. The essence of the whole approach is to get the folks who

Hors d'Oeuvres

• *"Your markets are not standing armies but passing parades." observes a beverage bottler. Here today and gone with the wind of a competitor's advertising copy.*

• Management has complained that women factory workers spread gossip and are jealous. But one can't expect women to cease being women just because they put on pants.

• *OPA has limited Army and Navy men on furlough to half a pound of sugar a week. But the boys in uniform seem to get enough sweets.*

• A bulletin on how to prepare greens for home dehydration says to wash in several waters to remove grit, trim off stems, and discard. Spinach, and to hell with it.

• *The Army has purchased 200,000,000 glasses of grapefruit juice, and not a squirt in a carload.*

• A German wit, asked when the war would end, is said to have replied: "When the British are reduced to eating rats, and by that time we shall be eating some substitute for rats discovered by our chemists." Must be propaganda. If the Nazis had so fine a sense of humor the war already would be over because they all would have died laughing at Goebbels.

• *There is evidence that much vitamin B, the courage vitamin, is lost from the body through perspiration. So that is why the brave are cool!*

• As the shortage of coffee became apparent, many retailers, to prevent hoarding, punctured holes in vacuum coffee cans, a mechandising practice with a point.

• *While Americans stewed over coffee rationing and waited in long lines to get half a pound of the vanishing beverage, Churchill arranged for us to have 65,000,000 lb. of tea. Could he be trying to convert us?*

• Boys at the tender age of 15 are allowed no coffee by the OPA. But boys of 18 are our toughest fighting timber. How time flies.

• *It has been reported that our armed forces shipped 2,000 bags of sugar from the U. S. to Puerto Rico. There will be no shortage of coals in Newcastle.*

• Though the demand greatly exceeds the supply, a tuna fish packer is advertising his product in national magazines, keeping his brand in the public mind. Must have a hankerin' to do a postwar business at the same old stand.

• *We knew from our Contents page that chemists had adapted pectin to new uses, but when we learned they were putting it into rubber tires our curiosity really jelled. Seems it makes the rubber stick to the cord.*

• Metal food cans were born in the wars of Napoleon 100 years ago and are disappearing in the wars of Hitler. The irony of it.

• *Because canned foods are not always available in the favorite brands and grades, distributors are issuing literature to explain the situation to consumers. But ere the battle's won consumers will welcome good food in any form and without benefit of apologies.*

• The plant of Marion T. Fannaly, Inc., at Ponchatoula, La., froze 450,000 lb. of strawberries in one day. Which might be called quick freezing.

F.K.L.

live with the job, and hence know it best, to develop better methods.

1. List all details of the present method.
2. Include all material handling, machine work and hand work.
3. Question every detail:
   a. Is it necessary?
   b. What is the purpose?
   c. Where should it be done?
   d. When should it be done?
   e. Who is best qualified to do it—man, woman, or girl?
   f. How is the best way to do it?
4. Develop new methods:
   a. Eliminate!
   b. Combine!
   c. Rearrange!
   d. Simplify!
   e. Work out ideas in cooperation with others.
   f. Write up the proposal for a better method.
5. Apply the new method:
   a. *Sell* it to the boss.
   b. *Sell* it to the operators.
   c. Get approvals on safety, quality, quantity and cost.
   d. Put it to work.
   e. Give proper credit to those who develop the ideas.

The last item is the most important feature. A single idea stolen means the end of all future help. Man will respond to the thrill of recognition of his performance more than to any other reward. But praise should also be supplemented by concrete rewards.

Scrap Metal Problem

Every bit of unused metal must be made available for the war effort. Half of our armaments are made of scrap steel.

What is now termed "dormant scrap" is under the scrutiny of salvage officers of WPB. This category includes machines, tools, fixtures and the like that cannot be used in their present form in the war effort. Here is the policy: If it hasn't been used for three months and no one can prove that it will be used in the next three months, then find a use for it or scrap it. In seasonal food processing this policy must, of course, be applied intelligently.

Despite the urgent need for scrap metal we have seen one apparent violation of this principle that merits approval. A food dehydrator, finding himself unable to procure the needed metals in fabricated form to expand his operations, bought the entire contents of a junk dealer's yard, had it carted to his plant and began to fabricate his enlarged plant literally out of scrap metals. The pile contained a considerable amount of old angle and tee bars, shafting, gears, bearings and broken machine parts. After completing the enlarged dehydration plant he proposes to sell the remaining scrap metal back to the dealer.

Such a resourceful action is entirely in accord with the general scrap recovery plans. But steel makers need every bit of scrap they can get in order to keep going at capacity. Do your part now. Half the steel in every tank, every gun, every ship must come from scrap, and 70 percent of the scrap must come from industry.

CMP—Something New In Priorities

Controlled Materials Plan is the name of a new set-up in WPB that should help a lot in getting supplies and equipment under priority restrictions. CMP is based on the end use of a thing being manufactured, and all necessary intermediate materials, supplies or things are to be put in line with it.

WPB estimates that so much of this, that and the other critical material is to be available in a given quarter-year. Army, Navy, Lease-Lend, Maritime, Aircraft, BEW, and indispensable civilian needs are calculated. Then the expected critical materials are allocated to these various "claimant agencies" on some basis agreed upon as the best possible compromise under the existing strategic conditions. Allocations are further subdivided so that each man in charge of a branch of WPB knows exactly how much of the critical materials he will be allowed to authorize. Subdivision is carried further so that each section head in a branch knows how much he will be allowed to authorize.

Thus a section head has a sort of bank account of so much of each metal, chemicals and so on, against which he can issue "checks" in the form of priority ratings for every critical necessity that goes to make up a product that is needed. The amounts of critical materials so allocated by priority ratings are then deducted from the totals originally made available for that quarter. No priorities are to be granted unless a credit balance remains.

Inasmuch as the WPB is now working out details for the second quarter of 1943, it is at once apparent that one's *needs must be anticipated by about six months!*

Rigid adherence to the new system should put an end to the continued and ineffectual up-grading of priority designations. And it should make it possible for a firm to get actual deliveries during a given 90-day period if priorities have been correctly issued.

Work Out Your "Manning Table"

Over-all strategy of the United States in war will determine internal events, including the allocation of industry and manpower. Heretofore it has been possible to secure draft deferment of "essential" men on a six-month basis. But now two new factors must be faced by management: (1) The "essentiality" of the business itself; (2) the distribution of the age groups within the industry—even if it is an essential industry.

In the enormous effort to build up a huge Army and Navy totaling about 10,000,000 men, and yet find 8½ million additional workers for war industries, the plan is to close down many a nonessential industry if it cannot be converted, then concentrate the production in a few plants, thereby releasing a lot of people for war work or military service. Furthermore, the plan is to strip even essential and munitions plants of all men of military age who are fit for service.

There is no fooling about it. The man may be "indispensable," your business may be an essential activity and must continue, but according to current plans the only relief you can have is: Work out your Manning Table, fill out form 42A (Selective Service), get them approved by the State Director of Selective Service and receive your state acceptance number. And only then can you get a six-month deferment for the "indispensable" man. Without a state acceptance number the man must go as soon as Uncle Sam starts writing postal cards to him, and you can't do a thing about it.

But don't take things easy. You will have only six more months to train a replacement. After that it is up to you to get along without the indispensable man who may be called.

The war in Europe will not end until the latter part of 1944. The war with Japan will not end until after that. It's your move!

WAR FORCES PROGRESS IN FOOD PROCESSING

By ERIC HARDY, Liverpool, England

Britain, Germany and Russia all have developed new ideas. Australia, South Africa and other countries are making new foods for troops. And countries that until recently had no food industries are preparing to export valuable processed foods

TIGHTENING of belts on the European food front has stimulated a great deal of important research and development in countries where the food supply is second only to armaments in this all-out world war.

"Down under" in Australia the war has stimulated a big increase in the output of canned fish, owing to the shortage of imports which formerly came from the United States and Canada. Australian tuna, pilchards, anchovies and barracouta have proved very suitable for canning. The chief canneries are at Flinders Island, Narooma and Twofold Bay, and they are mainly canning Australian salmon. There is also a crayfish cannery at Geraldton. Fish livers are used for vitamin oils.

Another of the United Nations, South Africa, has been experimenting with new food processes to improve the diet of its troops. The low temperature research laboratory of the Department of Agriculture has found that if beef is frozen, then dried in the frozen state, it can be restored to original fresh beef when required. Another discovery is that the South African guava has a higher vitamin C content than any other fruit known in the world, and more use is to be made of guava jelly, juice and flour. The guava, which is the fruit of the Poidium trees, also grows in South America, West Indies, Ceylon and other places.

Chocolate that will not melt in the tropics has been produced for troops in the desert war. It is still solid at the temperature of boiling water, but its taste is unharmed.

Soybeans are being canned in tomato sauce, giving the troops a higher food value than the beans ordinarily used.

Canning in South Africa

The Union is now canning 30,000,000 lb. of jam, marmalade and jellies annually. The war in the western desert stimulated South African food canning, but increased exports are being sent to African territories that did not previously buy from Cape Town. Huge quantities of canned vegetables have been packed for the army in Egypt, also sweet corn, potatoes, peas, beans and carrots, and mixed army rations of meat and vegetables in the one can. Formerly nearly all the canned sweet corn sold in South Africa was imported from the United States. The Union also cans pork and beans; beans and tomatoes; Vienna, beef and pork sausages; fish such as mackerel and pilchards with or without tomato sauce; fruit and jam; and even dried fruit for both troops and civilians. The $200,000 Western Province Fruit Research Station is planning even further development of South African food canning industries to capture the Far Eastern and African markets after the war.

Germany, like Japan, has learned to produce edible synthetic fats, by means of the fat-forming fungus *Pencillium javanicum* and the yeast *Endomyces vernalis*. This process was tried in Germany during the First World War.* It is now reported to synthesize fats from carbohydrates such as the glucose sugars on a large scale with more than a 40 percent yield. The reaction is stimulated by the use of alcohol vapor and the addition of sodium sulphite or sodium carbonate to the fermenting medium.

Experiments With Sweeteners

In order to conserve sugar supplies in Britain, experiments were made at Campden Research Station to determine the minimum density of sugars before canned fruits became unpalatable. The acceptable minimum has been found to vary with different fruits, and is about 20 deg. Brix for the least acid, like sweet cherries, and about 35 deg. Brix for the most acid, like loganberries, damsons and underripe fruit. Fructose, or levulose, which is the sweetest of the sugars, can now be obtained by hydrolysis of inulin in artichoke and dahlia tubers, but it is not yet commercially available for addition to canned fruits.

* Prescott & Dunn, "Industrial Microbiology," McGraw-Hill Book Co., 1940, Chapter X.

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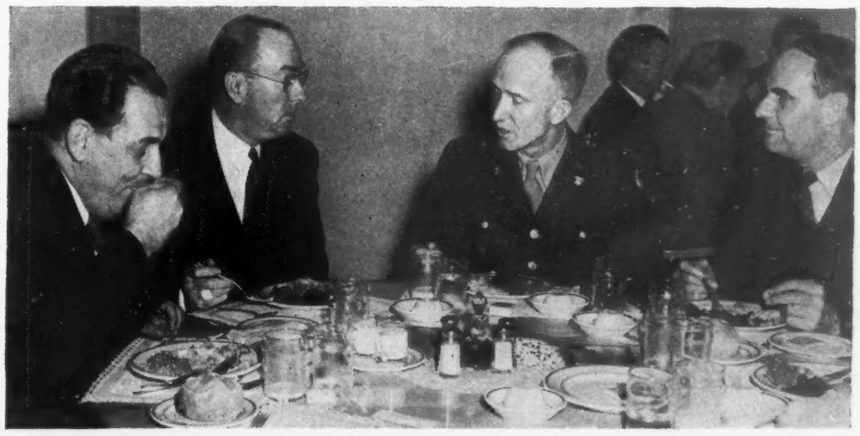

In this country, food processors under pressure of wartime needs have made big strides in the dehydration of foods. And a luncheon of dehydrated foods recently was prepared in Washington to give war agency officials first-hand evidence of the progress in that field. Left to right are Leon Henderson, OPA price administrator; Donald M. Nelson, chairman of WPB; Brig. Gen. Carl Hardigg, Office of the Quartermaster General; and William L. Batt, WPB vice-chairman.

The Western Regional Research Laboratory at Albany, Calif., where one of the schools on dehydration was held this fall. Dehydrater operators attended this school and the one held in Rochester, N. Y., to study proper dehydrating methods and learn to avoid serious mistakes of the type that are described in this article.

24 WAYS TO IMPROVE VEGETABLE DEHYDRATION

By L. V. BURTON, Editor of "Food Industries".

Many dehydrators are making mistakes which can but result in inferior quality and unnecessarily high costs. Unless corrected, these mistakes will spell failure for individual companies and may wreck the future of the entire vegetable dehydrating industry

THESE COMMENTS are excerpts from talks to the students at both the recent schools of dehydration at Albany, Calif., and Rochester, N. Y., on the "Future of Dehydration." Though not originally intended for publication, these observations relative to current practices that need improvement are printed here in response to many requests.

DURING a recent visit to most of the dehydration plants in this country I made many observations and reached some definite conclusions.

Of all the plants I visited, I found only a single plant that regularly dehydrates and cooks up its products to see if they taste right, to see if the product stores well. Of all food manufacturers, dehydrators are the only one who neglect this simple test of quality. In my judgment, every dehydration plant should test each day's run in this manner and compare it with the same product produced at least four months previously.

If such tests are not made, how are we to know whether the goods we turn out are fit to eat?

This, in turn, prompts me to observe that a part of this industry seems unconsciously to have an attitude that our products are animal foods rather than products for consumption by people just like ourselves. The contemptuous way in which our foods are handled in some plants leaves no other conclusion.

Cleanliness in all food plants is always paramount. The food dehydrator has no special license to operate or maintain an unsanitary or dirty plant, even when help is scarce. If the management thinks dirty, is careless, does not esteem cleanliness and sanitation, then there is little prospect of a clean plant. Anyone with industrial experience in food processing knows that a clean and sanitary plant is the result of the will of the management to be clean. It never happens by accident. A clean plant is the result of sanitary discipline, long imposed. Each employee must be taught his own personal share in the job of keeping the place clean. Then he must be followed up. And unless management insists on cleanliness, it is a foregone conclusion that there will be no cleanliness.

I have seen many very fine, clean places; I have seen some others that were merely disorderly; and, I am sorry to say, I have seen a few that were in very bad shape. (Dirty toilets, and lack of a clean place for employees to wash their hands will do much to break down sanitary discipline. Without such elementary facilities for cleanliness, the whole sanitary tone of the plant is set at a low level, indeed. It should not be necessary to mention these things, but some of my recent observations constitute a basis for pointed criticism.)

For further remarks pertinent to the future of dehydration I shall group my observations together under two general categories: Engineering and control methods.

Engineering

In a very substantial number of factories I find that the engineering of dehydration operations is not of the proper

degree of excellence. Some of the defects of engineering are as trivial as the use of a poorly designed globe valve instead of a gate valve on a blancher. There was the case of a boiler too small to provide high-pressure steam and the globe valve's design was obsolete in that it failed to permit the full flow of steam into the blancher. Possibly the difficulty of getting good valves as well as adequate boilers may have been at the root of the trouble.

I have seen exposed steam pipes which, of course, waste heat. I have seen steam blown directly against a food material in a blancher without straining, the operator taking the serious risk of blowing pipe rust and scale into the food. If such contamination gets into the food, the quality—especially the flavor—will be seriously impaired. I am sure, from past experience with this problem, that pipe scale consisting largely of iron compounds will not improve the quality of a dehydrated food, such as cabbage.

Steam engineering is of far greater moment to eastern operators than to those of the Far West, and presumably will continue to be of greater importance for some time. The reason lies in the scarcity and cost of fuel oil and gas in the eastern half of the United States. This means that coal must be used to produce the necessary heat, but the products of combustion of coal must not be permitted to come into contact with foods. Coal must be burned under boilers and the heat must be used indirectly, either through steam or some other heating medium such as Dowtherm.

High altitudes are seldom problems east of the Rocky Mountains, yet I must report one observation that may be of use to some of you. One company, located 5,000 ft. above sea level, was installing a second boiler to get more blanching and scalding steam. The first boiler was not installed in the way necessary to secure proper combustion of bituminous coal at that altitude. Its firebox should have been much higher and its chimney should have been larger and higher, for as you go up in the air there is less oxygen per cubic foot. Without actually conducting boiler tests at that plant, an expert opinion is impossible. Yet, based on my own previous experience in operating plants in high altitudes, I am convinced that the old boiler raised to 8 to 10 ft. off the grates, plus an adequate smokestack, would have provided all the steam necessary. The company, however, installed a second boiler. The only kind of boiler the folks could find was a Scotch marine boiler, internally fired, a type best used at sea level.

While this factory now has a sufficient supply of steam, the cost of the second boiler could, perhaps, have been avoided. And what is still more important, the new boiler might have been used for some other purpose by somebody else. Boilers are really scarce today.

Continuing our discussion of steam engineering for a moment, let me comment on blanchers and scalders as I have seen them in the dehydration industry. Most of them are performing to a good degree of satisfaction, but many are costing more to operate than need be. Their designers seem to lack "steam sense." Take the continuous type of blancher, built with a 2-ft. hump in the middle. Many of these have a stack vent, about 2 ft. square, located at the highest point in the hump. This is usually left wide open and steam rolls out the top in enormous clouds. Of course, the air in the blancher or scalder must be displaced by live steam, and this is facilitated by a bleeder vent at the highest point. But after the air is displaced there is no need for blowing steam out into the atmosphere. It is sheer waste of fuel and boiler capacity. As long as steam rolls out the ends of the continuous blancher or scalder, once it is in steady operation, that is sufficient.

I have seen one hump-back blancher in which the angles from the horizontal were not equal. One leg was nearly horizontal; the other dipped about 30 deg. Steam was billowing out the end of the nearly horizontal leg, but none was coming out the other. This showed that cold air was probably entering the lower leg, rendering a part of the equipment wholly useless. Lest my comment on this point seem silly, let me add that I have learned subsequently from official sources that this company has suffered rejection of several lots of its dehydrated foods because the enzymes had not all been inactivated. The process was all right in principle, but the prin-

Part of the class in dehydration at the school held at the Western Regional Research Laboratory, Albany, Calif. The faculty occupies most of the first two rows. The comments in this article are from talks that were given before the students at this school and subsequently at the one in Rochester, N. Y., on the "Future of Dehydration."

ciple had not been properly applied. This constitutes an error of engineering —an error that was wholly needless.

In some plants the use of water has been prodigal and wasteful, particularly where water is scarce and costly. Water can be reused in some services with good economy. For example: The rinse water used to remove starch from potato strips after placing them on trays could be pumped over to become the make-up water in the first washing of field-run potatoes.

Too little attention is paid to the finer points of operation, especially those which contribute to uniformity of product. It is fairly common practice to spread the dripping wet product on trays, and then to stack the trays on the trucks or cars that carry them into the drying equipment. Each tray drips water successively onto the product on the next lower tray. This dripping continues even after the car with its 28 trays is placed in the tunnel and the drying begins. Hence the top trays dry out before the bottom trays, and if the temperature at the hot end is set so as to produce proper drying of the bottom trays, it is inevitable that the top trays are exposed to needlessly high temperature.

My own proposed remedy for this condition would be a means of conveying the trays from the spreading operation over a suitable distance that would permit most of the drip to fall in some place other than into trays of other food to be dehydrated.

The so-called equalizing bin or final stage of drying is just coming into use. It is a logical application of the principles of physics, provided it is properly done. Yet I have seen an unfortunate effort to install an equalizing bin where apparently there was no understanding of physics or food technology. In this plant they had piped warm moist air from the wet end of the drying tunnels into the equalizing bin. Thus they were actually returning moisture to the product after it had been dried crisp. When I was there the dried onions had become very damp and plastic. The superintendent, realizing that something was wrong, had shut off the "hot air" and was regretting that he had ever put in an equalizing bin.

I have also seen packaging rooms that were merely rooms, unsuited for packaging. Many dehydrated foods, especially onions, are hygroscopic. They absorb moisture very readily. Therefore, in packaging, they must be handled in a very dry atmosphere. To wall off a space and fail to create the proper conditions for packaging is to waste lumber, nails and carpenters' labor. Yet I have recently seen this error of engineering. The room was very damp. Conveyor belts were damp. There was no easy way to ventilate the room and no way to dehydrate the atmosphere. Even though the out-of-door atmosphere was more suitable than the packaging room atmosphere there was no way, short of knocking down a wall, to substitute the dryer air from outdoors.

The lack of knowledge of unit operation costs within most plants is appalling—nothing less. Take the cost of peeling for example. I don't care what vegetable is being peeled. I refer to the cost of the peeling operation. Only one plant of the more than 40 I have recently visited had any exact information on the cost of peeling. Only a few plants had any knowledge of the loss of raw material in the peeling operation. In the case of potatoes the losses of material have been reported to extend all the way from 8 to 42 percent. (I find it difficult to believe the 8 percent figure, and if I were the owner of the plant that was losing 42 percent of my raw material there would be fireworks.) Only one plant in all those that I have visited is so equipped and designed that it is readily possible to determine the costs and the weight of material at several significant points along the line.

This lack of knowledge of the costs of various unit operations arises from only one source—a management which either does not care or does not realize the need to know costs. If management does not know how much it costs to prepare for slicing, say, U. S. No. 1 potatoes vs. U. S. No. 2 potatoes, vs. field culls, how can it intelligently decide how much it can afford to pay for one or the other grades? To wait for the annual audit is suicidal.

There is altogether too much deciding "by guess" and "by gosh" in the dehydrating industry today. This criticism applies not only to procurement methods, but to engineering problems and to control of operations.

Control Methods

Let us now consider the control methods as they exist, or do not exist, today. You can find any sort of conditions in this dehydration industry that your imagination can conceive.

I have been told that nobody but a novice—one who does not know his business—needs any instruments at all, not even a thermometer. I have also been told by a man, who possibly may be forgiven for not knowing better, that all he needs to do is to stand in front of his tunnels at the wet end to see if the hot-end temperature should be raised or lowered. "If my glasses fog up," he said, "then I know everything is all right."

I have seen dryers in operation with broken thermometers, with dirty thermometers—so dirty that it was impossible to read them at all. I have seen wet-bulb thermometers that were dry. I have seen plants where nobody ever looked at a thermometer.

In one plant I cleaned up the thermometers so that they could be read. Strangely enough there was water in the wick of the wet-bulb thermometer. Here was a plant with Puccinelli tunnels, 10 cars long, but they were placing only 7 cars in the tunnel "because they seem to dry better that way." The dry-bulb temperature of the exit air was 130 deg. F., while the wet bulb was 120 deg. F. This was a single-stage dehydration plant, which, of course, means that there was no equalizing bin.

The scarcity of recording instruments is amazing. But those who keep such records are the best operators and generally the most successful. At one place I visited, no one in direct charge of the plant was around, so I cannot tell you what the management's answers would have been. In this plant were three pairs of tunnels, all dehydrating the same product by one-stage drying. In the first pair of tunnels the temperatures were 160 deg. dry and 118 deg. wet; in the second pair, 158 deg. dry and 107 wet; in the third, 148 deg. dry and 108 wet (the relative humidities equal 29, 21 and 26 percent, respectively). I don't know which were the right temperatures, nor which were best; nor do I know if it really made any difference in quality. I suspect that the real difficulty lay in the cost of operation. Yet I find it difficult to believe all were right. The product was prunes, and as soon as the season was over the plant was to commence on vegetables. Unless closer control is exercised at that plant, I suspect that their first experience in vegetable dehydration may not be wholly happy or profitable.

Automatic temperature controllers are fairly generously used, but I believe they should be universally used and they should be supplemented by temperature recorders. And keep the recorders locked. A recording instrument that is not locked leaves a record that may not always be true.

The lack of automatic humidity controllers is also amazing. Very few plants have them. Of course I realize that once a counter-current dehydrater is in continuous operation on a given product, if the dry-bulb temperature on the hot, or dry, end is maintained, there will be little change in the entire system unless the weather changes. In the Far West, the weather changes are few, but in the East, where we really have

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These Food Plants Converted To Do Special War Job

By THOS. F. CASS, JR.
Container Corporation of America, Chicago, Ill.

Here's the inside story of how cereal, confectionery, dairy and sugar-grinding plants converted packaging lines to supply a critical demand for millions of 5-oz. cartons of dried eggs. For Lease-Lend export, these packages have to meet special requirements

ONE of the most puzzling problems in the conversion of food plants to an active part in the war program has been the form that the conversion should take—what products to produce or what service to perform with existing equipment and personnel.

In one field of Lease-Lend activity, the problem of what service to perform has been more than solved by the urgent need for dried whole eggs by our war rationed allies. During the early months of the war, the Federal Surplus Commodities Corp. shipped fresh shell eggs and frozen eggs to England, but due primarily to inadequate refrigerated-storage facilities, shipment of eggs in these forms did not prove satisfactory. The answer to this particular food supply problem was found in dried whole eggs which can be stored at normal temperatures and require much less shipping space than shell eggs.

To meet the Lease-Lend requirements, the domestic egg drying industry increased its production in less than one year from about 10,000,000 lb. to more than 250,000,000 lb. To facilitate distribution under the British rationing program of three eggs per person per month, over 50,000,000 lb. of these dried eggs was to be packed in 5-oz. consumer packages. The contents of the 5-oz. package are equivalent to one dozen shell eggs and serve as the monthly quota unit for an average family of four.

This consumer-packaging program offered an immediate opportunity for America's food industry to convert some of its equipment to direct war use and to draw upon its broad experience in mass production of unit packages.

The FSCC set up a procurement program whereby "table quality" dried whole eggs would be purchased in 150- to 175-lb. barrels from approved drying plants and shipped to packaging contractors for repacking. These contractors, selected on a competitive-bid basis, assumed the task of adapting their packaging lines to handle an acceptable 5-oz. package. It became their job to package the egg powder from the bulk barrels into 5-oz. containers in compliance with specifications under supervision of a resident government inspector, and pack these units into shipping containers for export.

The first task of the Lease-Lend officials was to draw up packaging specifications which would adequately protect the hygroscopic egg powder during any extreme atmospheric conditions which might be encountered during distribution and storage, and at the same time attempt to specify a type of package that would lend itself to mass-production methods on already existing equipment. FSCC specialists and packaging engineers of the paper-board industry, acting under the guidance of the technical advisory staff of the British Food Mission and the packaging committee of the National Egg Products Association, considered the various requirements and developed a suitable packaging program.

To get the filling of 5-oz. cartons of dried eggs under way on converted packaging lines, improvised means often had to be used. Here cartons are being filled semi-automatically on an improvised conveyor, which is a step ahead of manual operations.

The 5-oz. packages of whole egg powder are check-weighed after filling. An early step in converting confectionery packaging equipment was the adjusting of existing conveyors or the building of conveyors from readily available materials.

After top sealing, the packages are passed through thermoplastic baths or dipping machines to obtain an overall protective seal against moisture vapor. One packer uses a machine designed to wrap and dip confection packages.

Packers using converted chocolate coating machines to wax-coat the packages make use of a confection cooling tunnel to assure hardening of the thermoplastic preliminary to overwrapping with a waxed paper label.

The primary factor considered was protection against physical and chemical changes in the egg powder caused by absorption of moisture from the atmosphere and by free passage of oxygen over the product. Excessive moisture and oxidation hasten the development of rancidity and bring about a loss of quality, texture, flavor and vitamin content in addition to preventing satisfactory reconstitution of the powdered eggs. The package must also be sufficiently grease-resistant to prevent absorption of the fat content of the eggs. Supplementing the protective requirements, consideration was given to production-line adaptability, consumer appeal and functional practicability.

Packages are of Three Types

The final 5-oz. package specifications were written around three general types of existing packages which had all of the required protective and functional requirements. Their adoption eliminated the necessity of designing wholly new packages and packaging machinery. These three types include:

1. The Dacca Vapo-Pak carton, a single unit package consisting of seal-end carton coated both inside and out with a moisture-vapor and gas resistant thermoplastic and "flow sealed" by a new thermal process to insure a continuous barrier film. This package has been in commercial use for protective packaging of such products as dry cereals, vitamin wafers, dry malt powder and frozen foods.

2. Cartons with a suitable protective barrier obtained by various combinations of laminations, wrappings and thermo-plastic coatings. In this group are included seal-end cartons made from asphalt or wax laminated boards and coated on the outside with a thermoplastic compound, and cartons overwrapped with heat sealed wax paper and coated by immersion in paraffin wax. Packages of this type have been used commercially for dry cereals, chewing gum and various confections, and also for several Army foods, including U. S. Army field rations "D" and "K."

3. Carton with inner protective bag. A number of moisture-vapor and grease resistant bags now in commercial use for hygroscopic products may be adapted to dried egg packaging. These bags are usually made from laminations of various films such as cellulose acetate, metallic foils or glassine and sulphate paper with moisture-vapor resistant thermoplastic laminating adhesives. An outer carton is used with these bags to complete the merchandising unit and protect the package during storage and distribution. The bag may be attached as an integral part of the carton or a separate preformed bag may be used with either a seal-end or tuck type carton.

No definite dimensions are specified for the 5-oz. unit. A capacity tolerance of from 19 to 23 cu. in. is allowed to accommodate egg powders of varying density and to make use of as many existing packaging lines as possible with a minimum number of changes. That the density of the egg powder would vary with different drying systems and geographical plant locations is recognized. To insure delivery of a uniform product to the packaging contractors, the egg powders are classified according to density and on that classification are shipped for repacking to those plants best suited to handle a predetermined density from the standpoint of their carton size and packaging equipment.

Shipping Container

The shipping container specifications call for packing 72 of these 5-oz. cartons in a unit container which serves as the wholesale distribution unit in England. To give adequate protection to the individual packages during storage and shipment, this unit container is made in regular slotted construction from 200-lb. test corrugated board with additional cushioning obtained from the use of separate non-test corrugated inner side-wall liner and top and bottom pads. For further protection against weather damage and for economy in handling, two of the unit containers are packed for export shipment in a 0.100 FSCC weatherproof solid fiber master container. The inner unit container is sealed with adhesive while the outer master container is both adhesive-sealed and double-strapped with ⅜x0.015-in. flat steel bands.

Upon completion of the packaging specifications and details of the procurement program, the FSCC requested bids on a cost-per-pound basis for packaging dried eggs through December 31, 1942. The following successful bidders are now repacking egg powder under this procurement program:

1. American Products Co., Cincinnati, Ohio.
2. E. J. Brach & Sons, Chicago ,Ill.
3. Harry Atlas Sons, New York, N. Y.
4. Cracker Jack Co., Chicago, Ill.
5. Duncan Coffee Co., Houston, Tex.
6. Samuel Dunkel, Inc., New York, N. Y.
7. Fort Worth Poultry & Egg Co., Fort Worth, Tex.
8. General Mills, Inc., Minneapolis, Minn.
9. June Dairy Products Co., Jersey City, N. J.
10. R. C. McAteer, Pittsburgh, Pa.
11. Quaker Oats Co., Chicago, Ill.
12. Wm. S. Scull Co., Camden, N. J.
13. Shellmar Products Co., Mt. Vernon, Ohio.
14. Shotwell Manufacturing Co., Chicago, Ill.

15. The J. R. Watkins Co., Winona, Minn.
16. The Cuneo Press, Chicago, Ill.

Most of these companies have had years of experience in mass production of consumer packaged products which require the same general handling technic and package protection as do powdered whole eggs. Others of those receiving contracts qualified because they either had available or were able to obtain idle packaging equipment, had the necessary plant and labor facilities, and availed themselves of the services of experienced packaging engineers.

How Companies Converted

Of the former group, the Quaker Oats Co. was able to convert without difficulty their Dacca process line, which had formerly been used for packaging individual units of breakfast food, to handling this new dried egg product. Since the former carton size holds exactly 5 oz. of dried eggs, no changes were required except in the filling operation where a new auger-type volumetric filler was found necessary to handle the product at the required production speed.

In this installation the Dacca Vapo-Pak carton is first bottom-sealed with adhesive on a standard mandrel-type bottom-sealer and then transferred to a Dacca coating machine where it is first completely immersed in Dacca thermoplastic compound and then drained to the proper film weight under controlled time and temperature conditions preparatory to cooling. Coating the carton after it has been bottom-sealed insures a continuous moisture-vapor-resistant barrier film across the bottom closure and manufacturer's joint and seals all cut edges of the carton against possible "wickage" of moisture or gas. Coating the carton inside and out just before the filling operation gives a sterile package which prevents introduction of new bacteria into the egg product.

After filling, the carton is automatically closed on a Dacca straight-line top sealer by means of controlled heat and pressure. In this heat-sealing operation the thermoplastic on the carton flaps is brought to a viscous semi-liquid state and then forced into all the cracks and crevices of the closure before cooling to form a permanent airtight bond. An additional feature of the heat-sealing operation is the "reannealing" of the horizontal scores along the top flaps, after the flaps have been folded into position, to maintain the continuity of the barrier film.

For more than 25 years Cracker Jack Co. has been packaging its molasses-coated popcorn confection in a moisture-resistant package for shipment to nearly all countries of the world. In that connection it has pioneered the field of protective packaging even to the extent of developing its own equipment for overwrapping cartons with wax paper and for dipping the packages in a molten thermoplastic. With its experience in protecting its confection against absorbing moisture and becoming "tacky" or sticky under high humidity or extremely variable temperature and barometric conditions, this company found conversion of some of its packaging lines to powdered eggs comparatively simple. Here again the existing container had the right volume capacity for 5 oz. of powdered eggs. Addition of auger-type fillers was all that was necessary after the preferred density group of egg powder was determined.

In this case, the package consists of an inner shell made from laminated grease-resistant board and into which the dried eggs are filled direct. The carton itself is not sealed with an adhesive after filling, but is held in a closed position by a heat-sealed waxed-paper overwrap. During filling and handling prior to overwrapping, the carton is held in desired positions by mechanical means to avoid spilling of its contents. After overwrapping, the carton is completely immersed in molten paraffine on a specially constructed dipping machine. When cooled, the package is again overwrapped with a printed label which is waxed on the inside to make heat-sealing possible.

E. J. Brach & Sons converted some of its candy packaging equipment, added a new carton filler and sealer, and rebuilt an old candy coating machine to handle its 5-oz. egg package. The package consists of a carton made from specially surface-treated, laminated grease-resistant stock. After being filled with the powdered eggs, the carton is adhesive-sealed on both ends. Then it is coated with a thermoplastic by the flooding operation of a converted chocolate coating machine. For additional protection the package is overwrapped with heat-sealed waxed paper.

General Mills, Inc., converted existing packaging lines formerly used for a dry cereal. These lines were developed to produce an economical protective package which would be sufficiently moisture-vapor resistant to maintain the crispness of the cereal products during their expected shelf life. Again the thermoplastic-coating is used, obtained by revolving the sealed package under a cascade of molten wax. Based on the theory that ordinary wax does not have adequate moisture-vapor resistance to satisfactorily protect dried whole eggs, the former cereal package is improved by combining the wax coating with the use of a carton made from moisture-vapor and grease-resistant laminated board.

The individual certal carton size was correct for 5 oz. of dried eggs, but to obtain additional production some other packaging lines were also altered to handle a 5-oz. package. Existing filling equipment was converted to handling egg powder by making adjustments and supplementary additions.

Different types of packages used for dried eggs. Left, box with moisture-resistant inner bag, not yet filled or coated (Shellmar). Second from left, Crackerjack carton after wrapping and dipping in thermoplastic. Third from left, box with laminated moisture resistant bag, not yet filled or coated (Interstate). Right, single-unit carton coated inside and out with moisture-vapor and gas resistant thermoplastic (Dacca).

Some of the other successful bidders adopted a package similar in principle to the General Mills carton, using a sealed carton made from moisture-vapor and grease-resistant board and an external coating of wax. None of these companies had all the necessary packaging equipment, but with considerable ingenuity they put together what they could obtain in new or second-hand machinery, supplemented by what could be made in their own or local machine shops.

In the case of the Shellmar Products Co., it had completed a bag and carton handling line for a prospective customer but was unable to make delivery because of priority restrictions. Rather than let the equipment be idle, it made a successful bid for a contract to package powdered eggs in its own plant. Its package consists of an inner moisture-vapor resistant bag made from wax-laminated glassine which is heat-sealed with thermoplastic adhesive after filling and then enclosed in an outer seal-end carton.

One of the companies was successful in purchasing a complete new packaging line to handle a moisture-vapor resistant bag-lined carton.

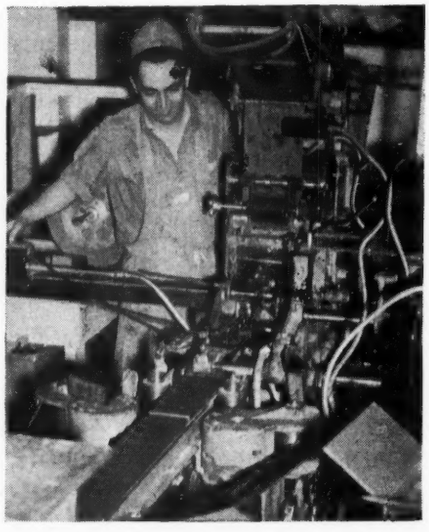
The June Dairy Products Co. utilized part of one of its Midwestern plants for the packaging of powdered eggs. Although it had no equipment which might be readily adaptable to the 5-oz. package, with the assistance of Container Corp.'s research department an acceptable package was developed which is being handled on equipment that was obtainable. This package consists of a specially constructed seal-end type carton made from laminated grease-resistant board, sealed on both ends with adhesive after filling, and coated by immersion to have a continuous film of a special Dacca thermoplastic. The surface of the carton is specially treated to insure proper application of the coating to make the package sufficiently moisture-vapor resistant and air-tight so that additional protection is unnecessary.

J. R. Watkins Co., which has recently obtained a dried egg packaging contract, is a "wagon jobber" selling and delivering household products direct to the home. Its sales will be greatly restricted for the duration because of the lack of tires for its delivery trucks. This firm has packaged many of its own products and has all types of carton sealing and filling equipment that is readily adaptable to dried egg packaging. Only the addition of some means of carton dipping equipment is necessary for it to handle an approved package consisting of a seal-end carton made from grease-resistant laminated board which is coated after filling and sealing by immersion in a moisture-vapor resistant thermoplastic compound.

American Products Co., manufacturer and distributor of a general line of household commodities, obtained approval on a dried egg package that could be handled on its regular equipment. As a result, only a few days' time was necessary to make the minor adjustments to put its packaging line into full-scale production on the 5-oz. egg package. The package consists of a special wax-paper wrapped carton made from moisture-vapor and grease-resistant board.

More Packages Under Test

In anticipation of increased Lease-Lend demands for consumer packaged dried whole eggs during 1943, the FSCC recently sent out invitations to all those firms properly equipped to produce protective packages within the size limitations of 19 to 23 cu. in. to submit sample packages for testing. Those firms interested in participating in this test received sufficient quantities of a controlled lot of dried whole egg powder to put up 36 of the 5-oz. test cartons.



One packer uses a converted soap-bar wrapping machine to overwrap the dried egg packages with waxed paper.

These sample packages are now being stored under controlled conditions of temperature and humidity at the Department of Agriculture's Forest Products Laboratory at Madison, Wis. At regular intervals, between now and the end of the year, these test packages will be examined by a group of experts representing the Department of Agriculture, the U. S. Army Quartermaster Corps and the dried egg industry. Those packages, or types of packages which prove satisfactory as a result of this test, will be acceptable for next year's packaging; and those firms submitting them, as well as nonparticipants who may have equipment for handling similar packages, will be given an opportunity to bid for contracts.

Machinery Required

The packaging of dried egg powder in 5-oz. units requires, in general, the use of one of the following groups of packaging machinery, in addition to auger-type filling equipment:

1. For Dacca Vapo-Pak carton: Regular Dacca processing equipment comprising carton bottom sealer, coating machine and top sealer. Available on proper priority with production speeds up to 90 cartons per minute.

2. For outside-coated carton:

a. Top and bottom sealer. Available with proper priority either new or second-hand. Carton sealing may also be done by hand or with home-made devices.

b. If no carton sealing equipment is available, cartons may be closed or sealed by overwrapping with heat-sealed wax paper. New and second-hand wrapping equipment are available with proper priority.

c. External thermoplastic coating may be accomplished by complete immersion of the sealed carton or by spraying with molten thermoplastic. Immersion coaters may be purchased with proper priority, or may be simply constructed in company's own machine shops. Carton spraying may be done on converted candy coating machines which may be purchased second-hand.

3. For bag and carton combination:

a. Some semiautomatic bag-sealing equipment may be purchased without priority, while the more elaborate automatic sealers require proper priority:

b. Carton-sealing equipment may be used if available; otherwise, a tuck-style carton may be used for hand closing.

No Formula for Conversion

As intimated by the developments in the packaging of powdered eggs in 5-oz. containers and by the experiences of the successful bidders for the egg packaging contracts, there is no cut and dried formula for food plant conversion to direct war program work. Conversion can result from contacts made with the U. S. Agricultural Marketing Administration or the U. S. Army Quartermaster Corps, who can and will advise as to what war program products are wanted and who will pass on adaptability of the plant facilities to produce those products or services. If packaging problems are involved, engineers of packaging equipment and containers are ready and willing to make a survey of existing or adaptable equipment and make conversion suggestions, even to the point of assisting in the conversion if necessary.

Tunnel Dehydraters and Their Use In Vegetable Dehydration

By W. B. VAN ARSDEL

Principal Chemical Engineer, Chief, Engineering and Development Division, Western Regional Research Laboratory, U. S. Department of Agriculture, Albany, Calif.

PART III—The operating characteristics of tunnel dehydraters are discussed in this article, which concludes a practical series on the use of this type of equipment for dehydrating vegetables

THE first two articles in this series (FOOD INDUSTRIES, October and November, 1942) discussed the factors which should enter into the selection of a dehydrater, summarized the main features of tunnel dehydraters, and gave a brief account of the physical processes which underlie the operation of continuous dryers of the tunnel type. This concluding article considers some of the consequences of physical theory as applied to dryer operation.

Temperature Change Along a Tunnel

Few commercial dehydraters are equipped with thermometers anywhere else than at the two ends of the tunnel. Thus the operator knows only that the air is substantially cooler at the exhaust end than at the incoming end. The rapidity of drying in the tunnel, however, is greatly affected by the manner in which temperature falls in the tunnel; if it falls rapidly near the incoming end, most of the tunnel is relatively cool and moist, while if it falls most rapidly near the exhaust end, most of the tunnel is relatively hot and dry. Physical theory makes it possible to predict with reasonable accuracy just how temperature will change along a tunnel under any given operating conditions.

Two facts which were emphasized in the preceding article may be considered in combination: First, the change in air temperature between two points along the tunnel is proportional to the change in moisture content of the product between those points; second, the rate of evaporation is high while the product is moist, but becomes very slow as the product approaches dryness. Then air temperature must fall greatly within a short distance near the wet end of the tunnel, but must remain almost unchanged near the dry end. The course of events evidently depends first of all upon the arrangement of circulation in the tunnel—whether counter flow, parallel flow, center exhaust, or other.* Figure 9 illustrates the effect of these differences in arrangement.

In the counter-flow arrangement (9a), the incoming hot air meets nearly dry product, which is losing moisture very slowly; the air temperature stays relatively high through most of the tunnel. When the flow is parallel (9b), the air temperature drops very steeply at the wet end of the tunnel, and is relatively low during most of its course. The center-exhaust arrangement (9c) combines the high-temperature portions of both of the preceding curves, and shortens the low-temperature portions. When it is remembered that evaporation is more rapid at high temperatures and large wet-bulb depressions than at low ones, considerable differences in the effectiveness of these arrangements may be expected.

* See first article, "Food Industries," October, 1942, page 46.

Effect of the Rate of Tunnel Loading

Suppose that trucks of raw product are loaded into the tunnel only at long intervals, so that the product is substantially dry long before it reaches the other end of the tunnel. Then if the arrangement is counter flow, the upper curve in Fig. 10 illustrates the situation; the air falls in temperature only slightly in passing through the tunnel. Now suppose the rate of input of moist product is increased, first moderately, then heavily. Something like the situations shown in the middle and lower curves of Fig. 10 will result. Evidently as the rate of input is increased the average temperature in the tunnel decreases—and the rate of evaporation from the product falls with it. At some definite rate of input the tunnel will

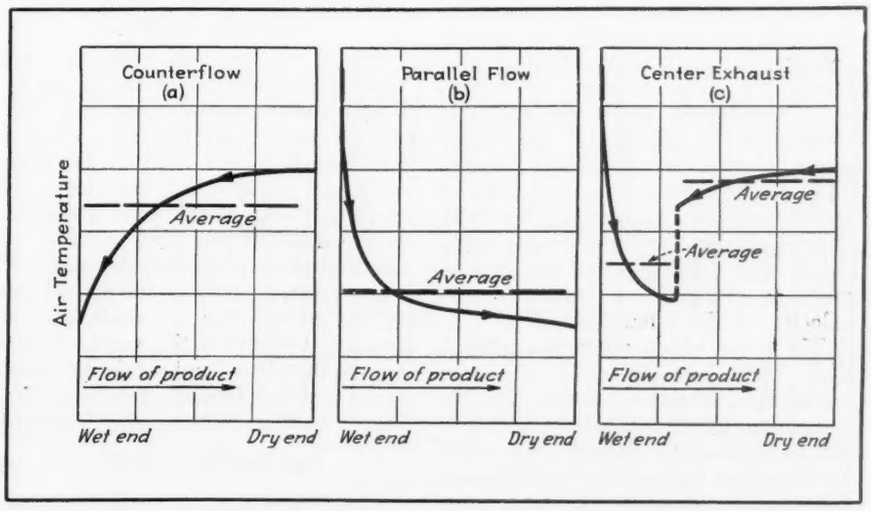


FIG. 9. Air temperature along tunnels of different types.

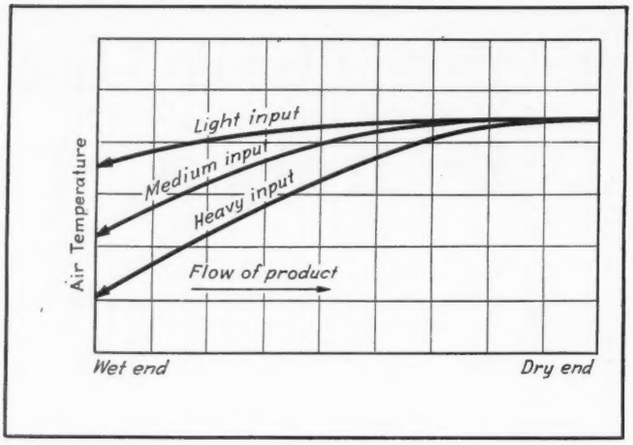


FIG. 10. Effect of rate of loading on temperature change along counter-flow tunnel.

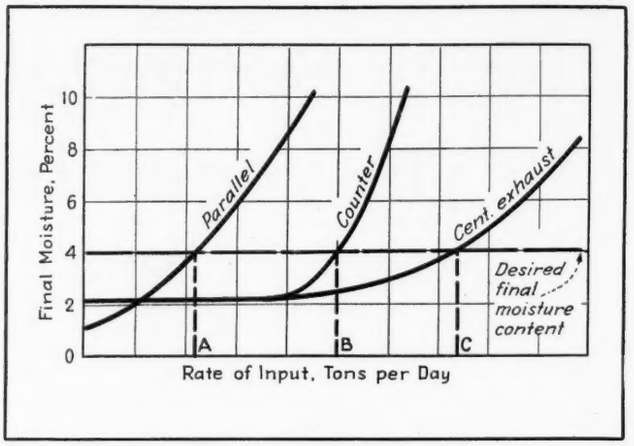


FIG. 11. Final moisture content of product vs. rate of input, in three different types of tunnel.

reach its practical operating level. At lower rates the fully dry product is exposed to high temperature for a needlessly long time; at higher rates the product leaving the tunnel is still too moist.

Counter vs. Parallel Flow

A useful way to visualize the characteristics of a tunnel is to draw a curve showing the relation of final moisture content of the product to the rate of loading, expressed, say, in tons input of moist product per day. Typical curves for the drying of one particular vegetable in a tunnel are shown in Fig. 11. All show some moisture retained even at zero rate of input—that is, even if the product is left standing indefinitely in the tunnel; this is the moisture content which is in equilibrium with air of the hot-end temperature and humidity.

The curve which represents typical counter-flow conditions rises only very slowly from this equilibrium value of moisture content until a fairly high rate of input is reached, then it starts to rise more and more rapidly. At the rate indicated by point *B* the moisture content of the dry product will be as high as is permissible, say 4 percent; this tonnage is the capacity of the tunnel under counter-flow conditions. Figure 11 does not show a numerical scale of tons input per day, because that will depend on the kind of vegetable being dried, tray loading, total tray surface and the temperature, humidity and velocity of the circulating air.

The curve which represents parallel-flow conditions indicates a lower equilibrium moisture content than the other, because in a parallel-flow tunnel the hot-end air temperature may safely be somewhat higher than in a counter-flow tunnel. However, the final moisture content rises steeply as tonnage is increased, so that in spite of this initial advantage, the capacity of the tunnel is lower (point *A*) than that of the counterflow tunnel (point *B*).

The curve which represents center-exhaust conditions resembles the counter-flow curve in shape, but rises more gradually, so that tunnel capacity at the desired moisture content is higher (point *C*). Sectional tunnels (for example, a short parallel-flow tunnel followed by a longer counter-flow tunnel) have a combined characteristic similar to that of a center-exhaust tunnel, as might be expected, since the principle is exactly the same.

The characteristic curve of a center-intake tunnel arrangement* resembles that of a parallel-flow tunnel, since the finishing section operates under parallel-flow conditions. In general, there is nothing to recommend the parallel-flow arrangement if it is used either for the entire tunnel or for the finishing section; there is a distinct advantage in using it for the first stage of drying.

Effects of Specific Differences Between Products

Figure 12 illustrates, with the same kind of diagram, the difference in behavior between slow-drying and fast-drying products in the same counter-flow tunnel. At the right of this figure a dashed straight line represents the maximum evaporation that is possible in the dryer at the given air flow, air temperature, and wet-bulb depression.** The drying capacity of the tunnel cannot be greater than this limit, no matter how fast-drying the vegetable may be. On the other hand, while the evaporative limit substantially determines how much of the faster drying vegetable may be handled, it has very little effect on the capacity for the slower drying one.

Effect of Increasing Air Flow Through Tunnel

Consideration of the relation of evaporative limit to drying capacity suggests what would be the general effect of increasing the air flow through this counter-flow dehydrater. Figure 13 illustrates what would happen. The faster drying material can part with its moisture very rapidly if sufficient evaporative capacity is provided, so a large increase in output follows the increase in air flow. The drying rates of *both* products, however, are increased somewhat by higher air *velocity* over the product. The tunnel output is therefore increased a little even for the slow-drying product. In general, it is plain that the air flow in a tunnel should be reasonably well balanced with the type of material which is to be handled. If the same equipment is expected to dry prunes (slow drying) at one time and carrot strips (fast drying) at another, it will either fail to exploit the full possibilities of the naturally fast-drying vegetable, or if it is well designed for carrots, it will be wasteful of equipment, power and heat while it is drying prunes.*

Effect of Increasing Recirculation

In the preceding installment** it was shown that recirculating some of the exhaust air back to the heater to be mixed with fresh air would effect a considerable saving in heat, but at some sacrifice of drying capacity. The effect on tunnel capacity of recirculating the

* See "Food Industries," October, 1942, page 46.

** See "Food Industries," November, 1942, page 48.

* See "Food Industries," October, 1942, page 44.

** See "Food Industries," November, 1942, page 47.

exhaust air is illustrated in Fig. 14.

When the proportion of recirculation is increased, the wet-bulb temperature in the tunnel rises. The consequences are complex. Among other things, the equilibrium moisture content of the product rises, and the evaporative limit of the tunnel falls. As the equilibrium moisture rises close to the desired final moisture content, the drying capacity of the tunnel recedes rapidly toward zero. As was pointed out in the earlier discussion, however, a moderate increase in wet-bulb temperature will bring about a substantial saving of heat with only a minor decrease in capacity. If high wet-bulb temperature is not required to avoid casehardening, the best amount of recirculation can only be determined by balancing economic pros and cons; heat cost will be balanced against drying capacity. When the dehydrating equipment is the plant's bottleneck, it will usually be expedient to run the dehydrater with little or no recirculation, in spite of the higher fuel bill. If, on the other hand, preparation capacity is the limiting factor, there will be good reason to recirculate a high proportion of the air and save as much heat as possible.

Effect of Variations in Tray Loading

It is only natural for an operator who is being pushed for production and more production to load trays very heavily. Experience eventually teaches him that he gains nothing in daily capacity by loading above a certain point. It is rarely recognized, however, that the best all-around tray loading is substantially lower than the one which will give the absolute maximum tunnel capacity. Figure 15 illustrates the effect of changes in the load of cabbage shreds and of potato strips spread on a square foot of tray. The circulation of air is assumed to be across the trays. If air circulates *through* the material there is a similar effect, but the optimun loading per square foot is much higher.

Consider first the curve for potatoes. At very light loads the tunnel capacity increases directly as the tray load increases, but at higher loads the rate of increase in capacity becomes slower and slower. At loads above 1.4 or 1.5 lb. per square foot, only a slight increase in capacity can be realized by heavier loading. The corresponding drying times are spotted on the curve.* Note that time increases rapidly at the heavy loads. Maximum tunnel capacity will be attained at a load of about 2 lb. per square foot, but drying time will be very long. Drying time may be greatly shortened by decreasing tray loading to, say, 1.2 to 1.3 lb. per square foot, and the resulting loss of capacity will not be serious. *In view of the well-established fact that rapidly dried vegetables are superior in quality to slowly dried ones, the wisdom of moderate loading is apparent.*

The curve showing the effect of tray loading in the drying of cabbage is similar, except that a maximum of tunnel capacity is reached at the relatively light loading of 1.1 lb. per square foot. At heavier loads the capacity actually decreases. As in the case of potatoes, there is a substantial benefit in drying time if the loading is held on the light side of this maximum; the penalty on capacity is only minor at a load of 0.9 lb. per square foot.

These facts emphasize indirectly the great importance of *uniform* tray loading. If a few trays in a truck are carelessly loaded at the rate of 1.5 lb. per square foot, while others are loaded only at the rate of 1 lb. those few trays will slow down completion of drying by several hours, and both capacity and product quality will be sacrificed. The same kind of result follows if the load on the trays is spotty or very uneven. Piling up of the product in the corners and along the edges of the trays is known to be especially damaging.

Complications in Practice

Tunnel dryers, like many other apparently simple types of industrial equipment, are subject to complexities which no simple theoretical treatment can handle. Physical theory, upon which most of the foregoing discussion has been based, gives answers which are perfectly sound as far as they go, but which have obvious limitations. Fortunately, in this case the limitations are relatively unimportant.

Discontinuous Operation—One of the complications is that the tunnel-and-truck dryer is actually a "progressive" dryer; it is not truly continuous in operation. If the tunnel is reasonably long—say 10 or 12 trucks—the difference from a continuous dryer is negligible. If it is short, however, the tunnel begins to have some of the characteristics of a batch dryer, and the routine of operation, particularly control of temperature and recirculation, will have to be somewhat different from that which would be suitable for a long dryer.

Suppose that, as an extreme case, the tunnel contains only three trucks. Then each incoming truck will stand in position No. 1 at the wet end for one-third of the total drying time. Within that time most products will have lost from 80 to 90 percent of their original moisture content, and the rate of evaporation at the end of the period will be less than 10 percent of what it was at the beginning. If no corresponding adjustments are made in

*The drying times shown in Fig. 15 are, of course, only illustrative; they will hold for one particular set of tunnel conditions. The conclusions given above are, however, general in application.

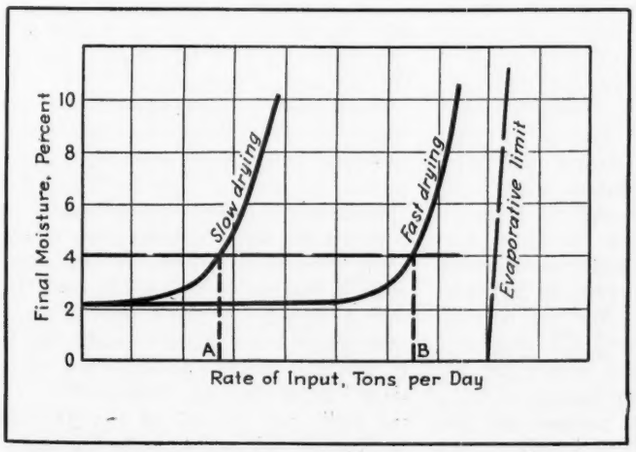


FIG. 12. Difference between slow- and fast-drying vegetables.

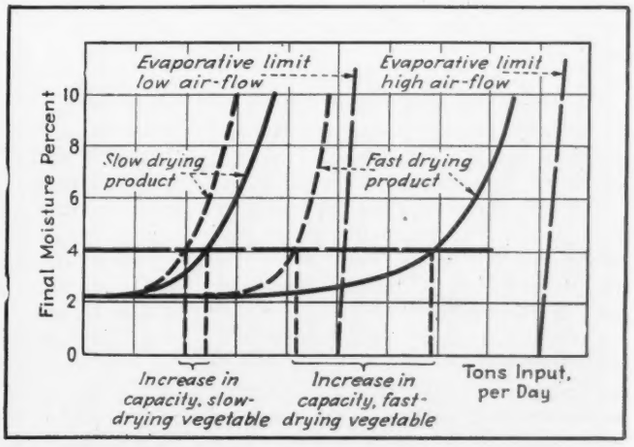


FIG. 13. Effect of increasing air flow in tunnel dehydrater.

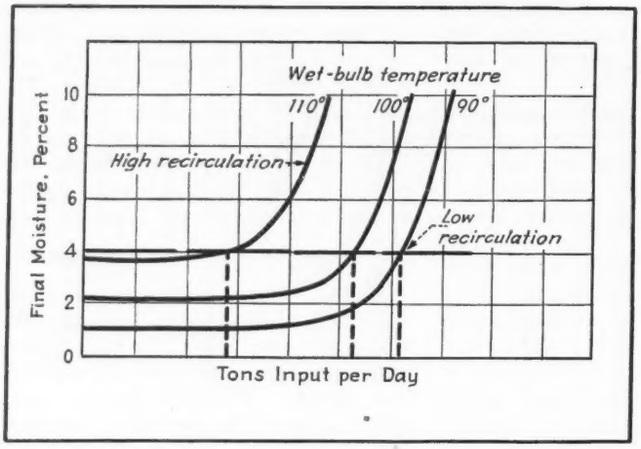


FIG. 14. Effect of increasing recirculation of air in a counter-flow tunnel.

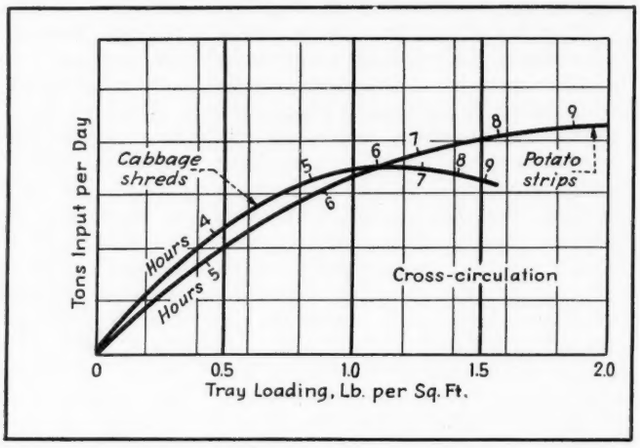


FIG. 15. Effect of changing tray loading of cabbage shreds and potato strips.

the heat input and the recirculation, a substantial rise in temperature and drop in humidity of the exhaust air will occur during the time that truck is standing in No. 1 position. The resulting waste of heat may be prevented by the use of an automatic control which will regulate fuel supply to maintain a constant hot-end temperature, and regulate recirculation to maintain constant wet-bulb temperature.

In a long tunnel the change in conditions caused by introduction of a wet truck is small. If a relatively long tunnel is heated by a fuel which may be easily and precisely throttled, like gas or oil, manual fuel control is practicable, and is very widely used.

Starting Up—When a tunnel dryer is put into operation, the first truck introduced will dry very rapidly because there will be little change in the air temperature encountered by that truck during its entire course through the tunnel. Each succeeding truck will dry a little slower than its predecessor, until finally a steady condition will be reached some time after the tunnel has been completely filled. The schedule on which fresh trucks are to be introduced should, therefore, allow for a gradually increasing interval between trucks at the start of a run.

For example, if ten trucks are used in a tunnel and normal drying time at full load is 6 hours, the normal interval between trucks is 36 minutes. But if experience shows that the first truck introduced dries in four hours, some such schedule as shown in Table II for the first ten trucks should give reasonably uniform drying of all ten.

At the beginning the proportion of recirculation may be very high—almost complete—and the fuel consumption correspondingly low. As additional trucks are introduced, recirculation must be reduced and fuel supply increased.

TABLE II—Truck Schedule for Dehydrater.

Truck No.	Truck introduced Elapsed time, hr., min.	Interval, min.	Total drying time, hr., min.
1	0:00	..	4:00
2	0:10	10	4:26
3	0:22	12	4:50
4	0:37	15	5:11
5	0:56	19	5:28
6	1:19	23	5:41
7	1:45	26	5:51
8	2:15	30	5:57
9	2:48	33	6:00
10	3:24	36	6:00

TABLE III—Minimum Wet-bulb Temperature in a Dehydrater (Deg. F.).

Outside air conditions		Hot-end dry-bulb temperature (deg. F.)		
Temp. (deg. F.)	% humidity	140	160	180
0	60	73	78	83
30	40	75	80	84
30	80	76	81	85
60	30	77	82	86
60	60	80	86	90
60	90	84	88	92
90	20	80	84	89
90	40	86	89	93
90	60	91	94	98
90	80	96	99	104

If automatic control of hot-end temperature and wet-bulb temperature is employed, these adjustments will be made by the instrument.

Interruption While Moving Trucks—While a dry truck is being removed, the string of trucks being advanced a step and a fresh truck being introduced, the end doors of the tunnel remain open. It is usual to shut off air flow through the tunnel during this time, both to protect operators who must work in the tunnel and to conserve heat. During this time, therefore, drying slows down, especially in the wet end of the tunnel. If changing of trucks is slow the total idle time will be considerable. Various expedients have been used to minimize this effect; for example, the trucks may be moved by a motor-driven winch instead of the slower lever-and-ratchet hand-operated winch, or the trucks may be introduced and removed through air locks so that circulation may be maintained uninterrupted.

Inequality of Drying—The adverse effect of uneven tray loading has already been emphasized. Several other faults in design or operation will also cause uneven drying and consequent loss of capacity and product quality. One of the commonest of these is non-uniform air flow. Since in most tunnel designs the air must change direction as it enters the tunnel, there is likely to be "crowding" of air to the outside of the curve. Consequently, the flow through the tunnel may be quite non-uniform unless measures are taken to "straighten out" the flow. Directing vanes are sometimes attached to the end doors in such a manner that they swing out of the way when the doors are opened. The trucks themselves are sometimes spaced from 4 to 6 in. apart, so that each such space will tend to act as an equalizer of air flow.

Uneven drying is almost sure to result if the tray bottoms sag materially when loaded. Not only is the tray likely to be loaded heavier in the middle if it has acquired a permanent sag, but also the air flow between it and the tray below it will be retarded where the sag is most pronounced.

Inefficiency of Air Usage—Unless the trucks fit quite snugly into the cross-section of the tunnel, a substantial proportion of the air may be circulated around and under the trucks instead of between the trays. Whatever air moves along these useless paths is, of course, entirely inactive in the drying, and the drying capacity of the tunnel is correspondingly lower than it might be. It is common practice to leave not more than 1 in. of clearance between the tunnel wall and the side of the stack of trays on a truck, and to make the under-

(Turn to page 108)

Facts of Vegetable Dehydration Revealed by Microscope*

By R. M. REEVE
Western Regional Research Laboratory, Bureau of Agricultural Chemistry and Engineering, Agricultural Research Administration, U. S. Department of Agriculture.

The photomicrographs shown here illustrate some of the tissue changes which are related to problems of vegetable dehydration. These will help you to understand need for proper dehydrating methods

FUNDAMENTALLY, the problem in vegetable dehydration is to remove water from the tissue, to retain the nutritive constituents in a sound and durable condition during storage, and to rehydrate the tissues when the vegetables are prepared as food.

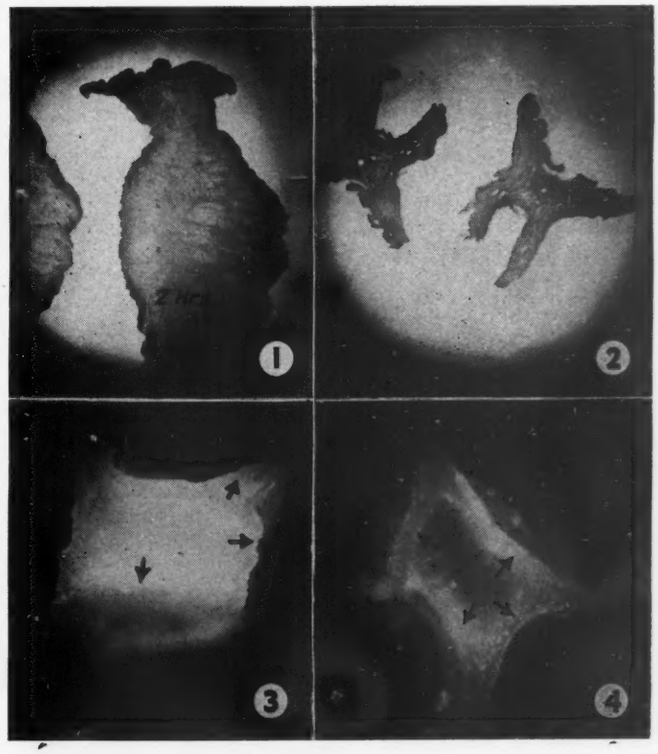
One of the difficulties is chemical change. Enzymes, molds and bacteria may start working. These can be controlled by speed and cleanliness in preparing the vegetable and, except in the case of onions, by blanching in steam or hot water. Experience and technical studies favor the steam blanch. Even when the enzymes have been inactivated by the blanching process, there are other chemical changes. There is danger from oxidation, high temperature and high humidity, which may cause the development of disagreeable odors. Control of these factors requires care and special methods of storage.

Another difficulty is physical change during the drying process. The structure of the vegetable tissue may be so altered by dehydration as to make passage of water in and out difficult. Case-hardening may take place and prevent uniform drying. If the dehydration is badly managed, the result may be bad odor and loss of valuable food nutrients such as vitamins, and the reconstitution may produce a mushy, lumpy, gummy or bad-tasting product.

The physical changes, and some of the chemical changes, can be studied microscopically. The microscopic observations show interesting correlations with some of the analytical data on vitamin retention and help to explain some of the reasons for vitamin loss.

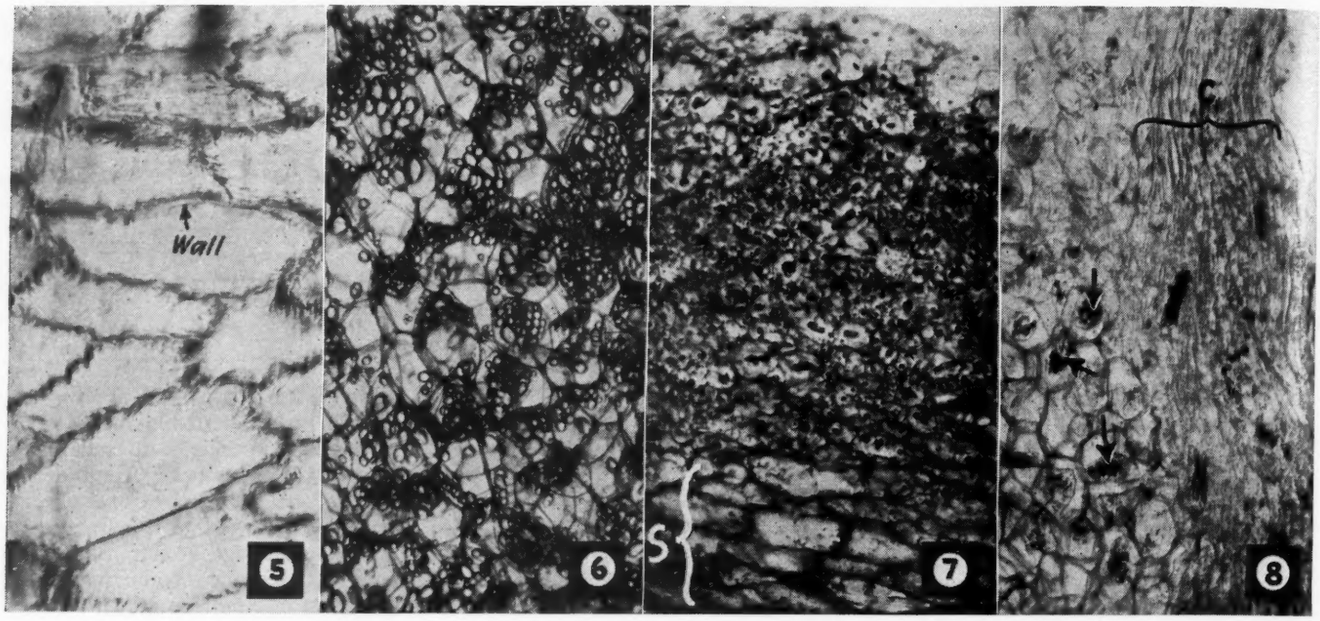
The left side of the drawing shows a potato cell by diagrammatic reconstruction about 400 times the actual size. Nearly all of the potato is composed of such cells. The water that must be removed is in the cell sap, cytoplasm and cellulose walls. When the cells are fully swollen, the tissue is crisp. When the cytoplasm is killed (by blanching, drying or freezing), it ceases to exercise control over the passage of water and, after drying, the soaking up of water may go ahead unimpeded. Potato cells contain numerous grains of starch which resemble minute shells in appearance. When heated to 150 deg. F., potato starch grains fuse and form masses of gelled starch in the cells. This starch gel is important in the movement of water. If thick potato slices are dried, a hard outside case is formed and the starch, gelled by blanching, obstructs evaporation from inner tissues. Gumminess or lumpiness then results in the reconstituted product.

Other parts of the cell are the nucleus (carrier of inheritable charactristics, and common to nearly all cells), the cell walls (composed of cellulose and pectic substances), and cytoplasmic inclusions. Some cells are chiefly important as food-storage vessels; others are woody and serve as conducting tissue. Woodiness of carrots and beets, for example, is caused by the development of such conducting cells, which contain lignin in their walls. Vegetables suitable for market have not yet developed much of this lignified tissue and are tender. Thus, any toughness of the dried product is more likely to be due to faulty drying, provided the vegetable was tender and crisp when fresh. Although cells of the various kinds of vegetables differ from each other, their cellulose walls permit ready passage of water. Carrot cells contain carotene bodies, but little starch. Carotene and a few other forms of provitamin A are the only vitamin substances that can



1—Unequal shrinking of carrot slice during dehydration, ×4. 2—Section of fully dried carrot cube. 3 and 4—Cut surfaces of potato cubes dehydrated 2 and 3 hours, respectively, ×4.

* Designated as No. 3695 in the outside publication series of the Bureau of Agricultural Chemistry & Engineering.



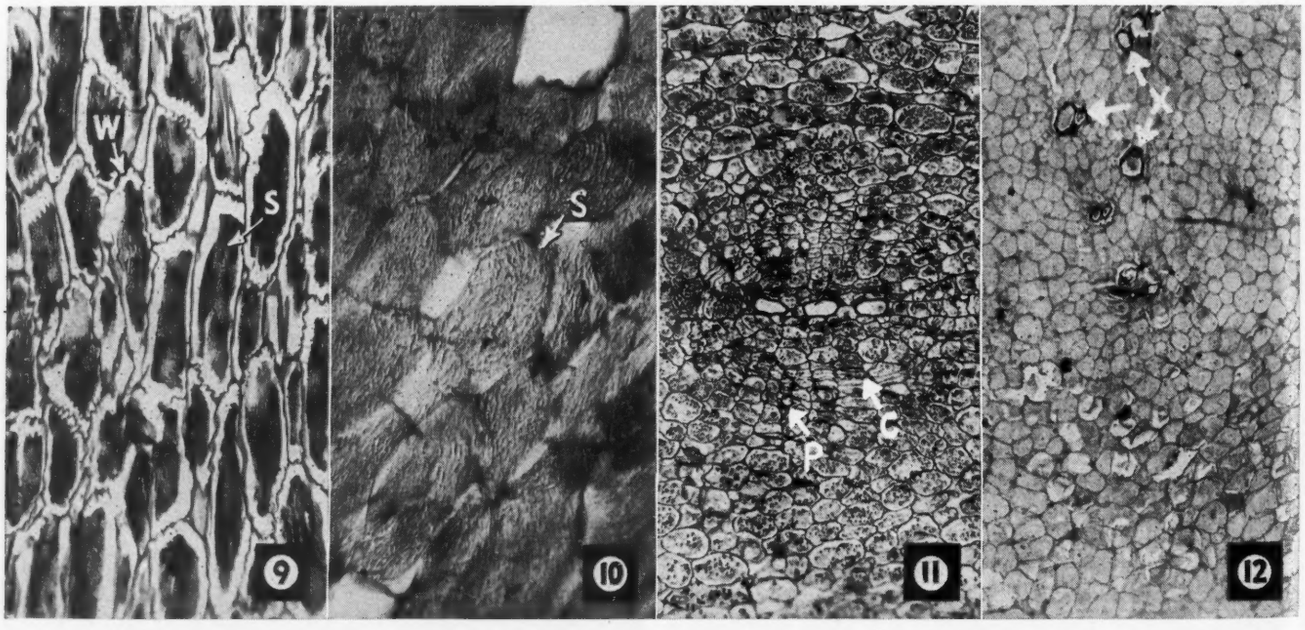
5—Cells of blanched dehydrated potato, ×600. 6—Section of fresh potato, ×100. 7—Edge of potato cube dried 2½ hours, without, blanching, ×100. 8—Dried potato, showing gelled starch masses, ×100.

be seen under a microscope in natural form. Sweet potato cells contain both starch and carotene, and green leafy vegetables contain chloroplasts which in part are comprised of the photosynthesizing pigment known as chlorophyll.

The cells of blanched, dehydrated potato, magnified 600 diameters, are shown in No. 5 of the photomicrographs. They are intact and their walls have shrunk. The starch grains have been gelled to form a uniform mass which seals the tissues. As the cell walls shrink, gases are forced out of the gelled starch which becomes clear and glassy.

The cut surfaces of potato cubes sliced in half are shown magnified 4 diameters in Nos. 3 and 4. The cube in No. 3 has been dehydrated two hours, and that in No. 4, three hours. An outer case (indicated by arrows) is being formed. If the cube is small, there is little danger of casehardening —that is, the formation of an impervious layer of collapsed cells and gelled starch will not become too pronounced before water has been removed from the inner cells. If casehardening occurs, the result may be internal rupturing of the tissue and the centers may "cook out" because the trapped water vaporizes and builds up an internal pressure. Slices ¼ in. thick are commonly dehydrated, and with success. They must be so arranged on the tray as to permit passage of steam throughout the layer of slices, and thus insure uniform blanching. Uniform blanching is essential to obtaining a uniformly dried product.

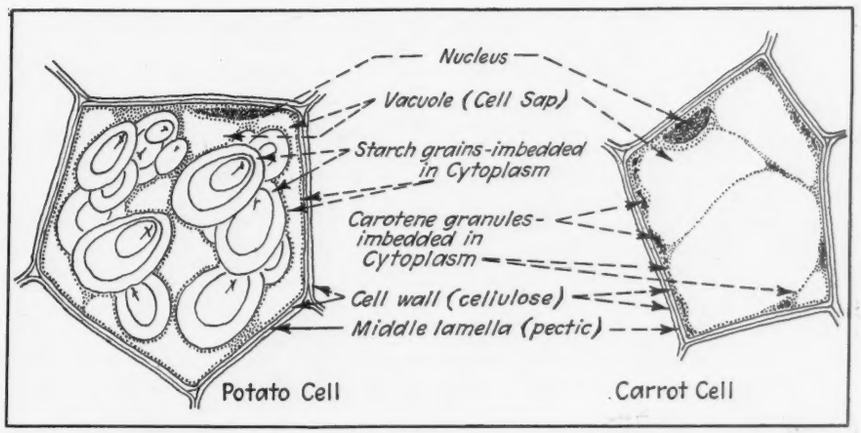
Photomicrograph No. 6 shows a section of fresh potato magnified 100 diameters. The cell walls and starch grains are clearly visible. No. 7 (also magnified 100 diameters) shows the edge of



9—Partially rehydrated potato, ×200. 10—Blanched, dried, potato after complete reconstitution, ×200. 11—Section of fresh sweet potato, ×50. Starch grains can be seen in storage cells. 12—Reconstituted sweet potato, ×50.

a potato cube dried 2½ hours, but without blanching. On the inside at this stage the starch is gelled (S), but in the outer layers it is not. Evaporation of water during the heating keeps the temperature at the surface below the gelling point of starch. If the drying temperature is high enough, gelling in the outer cells may occur later. If both gelled and ungelled starch are present in the finished product, reconstitution will produce a lumpy and pasty product. Intact starch grains on the surface give dried potato a chalky appearance. Recommended steps are thin slicing or cubing, spraying freshly cut material to remove surface starch, blanching in steam, and dehydrating at a temperature which will not scorch the vegetable. If "flash" drying of thick, unblanched (or blanched) slices is employed, casehardening may occur and the moist centers may "cook out" or caramelize. Such products also will be gummy and lumpy when reconstituted.

In No. 8 (also of dried potato magnified 100 diameters) the arrows indicate gelled starch masses containing trapped gases (apppearing dark under the microscope). This sample was blanched and shows the development of an outer case of highly collapsed cells with their starch contents gelled after 1½ hours of drying. No. 9 (magnified 200 diameters) shows partially rehydrated potato. The walls (*W*) imbibe water more rapidly than does the gelled starch (*S*) and tend to separate from the starch. No. 10 (also magnified 200 diameters) shows blanched, dried potato after complete reconstitution. Stain was used on the sections shown in Nos. 9 and 10 to bring out the details.



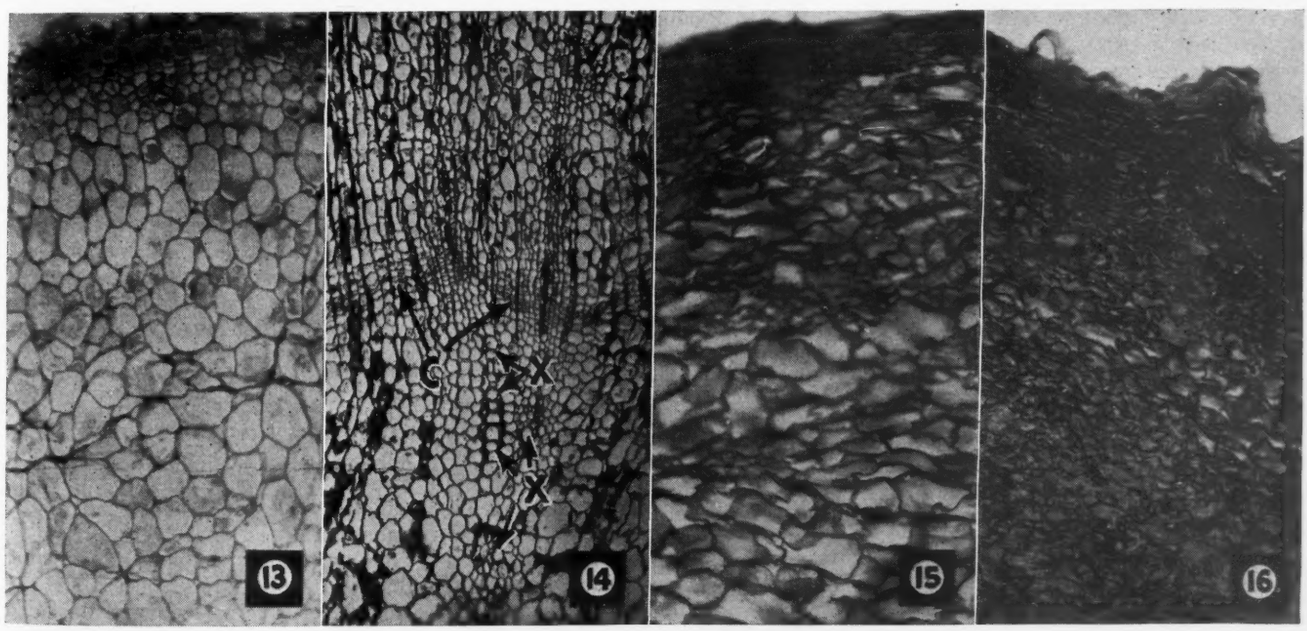
Left, diagram of potato cell, ×400. Right, diagram of carrot cell, ×400.

A prepared and stained section of fresh sweet potato magnified 50 diameters is shown in No. 11. The starch grains can be seen in the storage cells, and two kinds of conducting cells can be seen near the center. At center are xylem or water-conducting cells; *P* indicates phloem or food-conducting cells; and C indicates cambium or cells which divide to form new conducting tissues. No. 12 shows reconstituted sweet potato at the same magnification. The starch content was gelled by blanching before the tissue was dried.

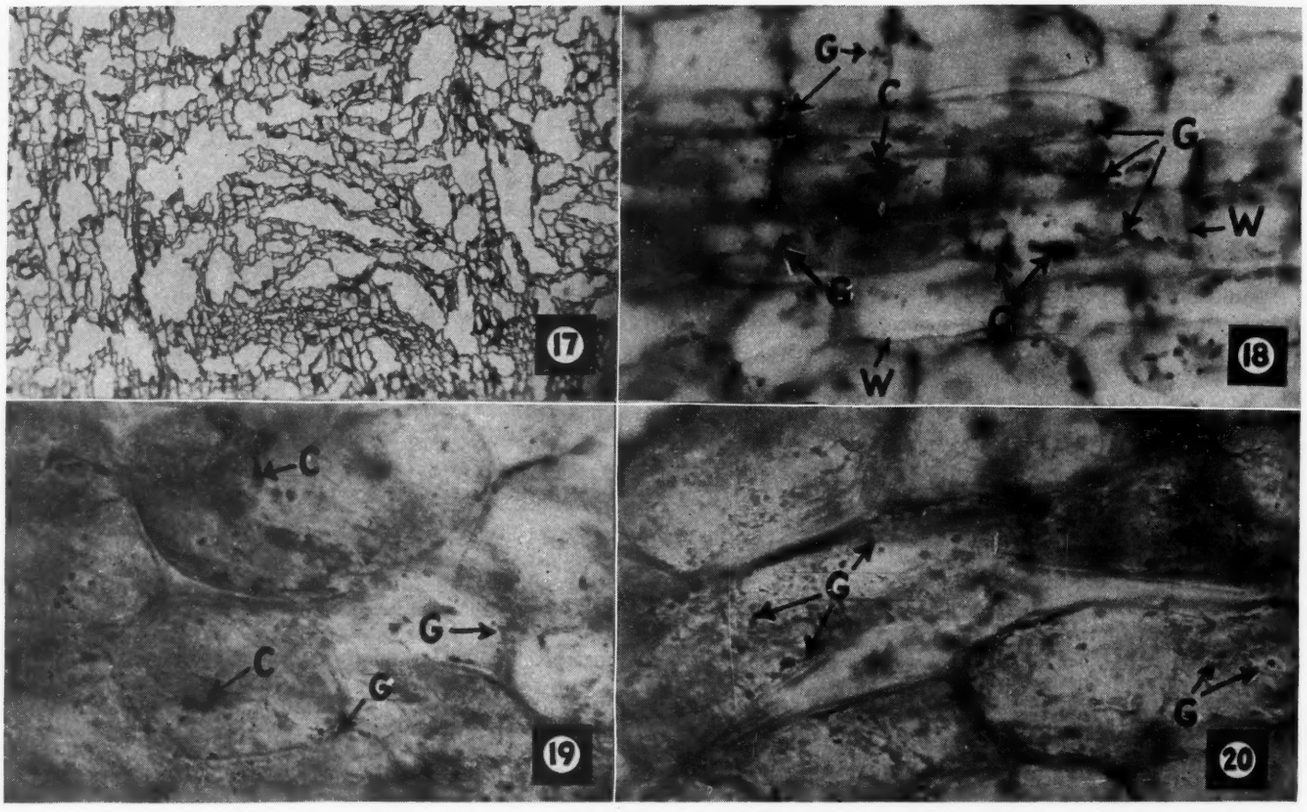
The right side of the drawing is a diagrammatic view of a carrot cell about 400 times actual size. The main difference between this and the cells of starch vegetables is the absence of starch and the presence of carotene granules (provitamin A). Carotene is responsible for the orange color of carrots.

The unequal shrinking of a carrot slice during the process of drying is shown in photomicrograph No. 1, which is a sectional view under magnification of 4 diameters. The failure of the core of the slice to shrink as severely as the outer cylinder is due to the presence of lignified conducting cells which tend to maintain their shapes and hold the other tissues in place. Later the core tissues collapse and dry thoroughly, and can be reconstituted readily. No. 2 shows a sectional view of a fully dried carrot cube.

The outer part of the raw carrot under magnification of 75 diameters is shown in No. 13. The small cells at the top are of cork tissue which is removed by



13—Outer part of raw carrot, ×75. 14—Region of core near outer cylinder of carrot, ×60. 15 and 16—Cell shrinkage after ½ and 2½ hours of dehydration, respectively, ×150. Shrinkage begins at surface and progresses inwardly.



17—Effect of vacuum drying after freezing carrot tissues, ×50.
18—Cells of reconstituted carrot, blanched before drying, ×200.
19 and 20—Cells of reconstituted sweet potato, and parsnip, respectively, showing oil globules in gelled starch.

peeling. No. 14 shows the region of the core near the outer cylinder of the carrot under magnification of 60 diameters. Cambium cells (*C*) and xylem cells (*X*) are shown. Nos. 15 and 16 show the cell shrinkage after ½ and 2½ hours of dehydration, respectively. It can be seen that the shrinkage begins at the surface and progresses inwardly. In these sections the magnification is 150 diameters.

No. 17 shows the effects of vacuum drying after freezing the carrot tissues. The magnification is 50 diameters. Potato processed in this manner is quite similar. Less shrinkage occurs than in vegetables dried by heat, but the tissues are ruptured by the formation of large ice crystals during freezing. Loss of carotene in carrots so processed is more rapid because of the greater area of surface exposed by the formation of pockets by the ice crystals.

Photomicrograph No. 18 shows the cells of reconstituted carrot (blanched before drying) magnified 200 diameters. Carotene granules are shown at *C*, oil globules at G and cell walls at W. The section was stained to bring out details. For comparison, note Nos. 19 and 20 in which the gelled starch gives the cells a grayish appearance. No. 19 is sweet potato and No. 20 is parsnip; both sections were stained to show the oil globules imbedded in the gelled starch. These were also cut from reconstituted samples that had been blanched before drying; carotene (*C*) is shown in No. 19. Dried sweet potato and parsnip reconstitute well, and, because of the sealing effect of the gelled starch in the dried products, they present no special difficulties in storage. Since carrots contain no starch (or little, if any), there is no sealing effect of the dried product. Thus, on a proportional basis, blanched and dried sweet potato stored eight weeks in air may lose only about 12 percent of the original carotene content, while blanched and dried carrot under the same storage conditions may lose over 40 percent of the original carotene content.

Extremely few oil globules are found in fresh carrot tissue and these may be the essential or volatile oil. The oil globules shown in No. 18 are vegetable fats, most of which are associated with proteins in the cytoplasm of fresh tissues. They are freed by the blanching process and coalesce into globules. Drying of raw carrot also frees these oils because the cytoplasm has been killed. As the tissues dry, the freed oils spread in thin films over the cellular surfaces. During this time the carotene becomes coated with, and even goes into solution in, the oil, and is thus temporarily protected against oxidation.

This protection is more effective when the carrot is blanched because of the longer time during which liberation of oil and the dissolving of carotene in it may occur, as compared with drying the carrot raw. It is less effective in the frozen-dried carrot than in the raw-dried carrot. Thus, blanched, dehydrated carrots retain their carotene better than do unblanched or frozen dehydrated carrots. This natural mechanism of carotene protection is similar to the common practice of preserving carotene in fixed oils. In the course of time the oil in dried carrot oxidizes and the results are "off" odors and more rapid carotene loss. At least a partial remedy for this sort of deterioration is exclusion of oxygen by storage in an inert gas such as nitrogen. Carotene deterioration does not show any significant relationship to moisture content as does loss of other vitamin substances. This appears to be best explained by the fact that carotene is oil-soluble, while vitamins B and C are water-soluble.

Young carrots contain more starch than do fully grown ones, but not enough for effective sealing of the dried tissues as in parsnips, potatoes and sweet potatoes. Blanched, dried parsnip

(*Turn to page* 107)

Power Trucks Merit Careful Maintenance

By F. L. SAHLMANN
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Power trucks save scarce labor, so keep them operating. In this article an expert tells you how to make them last longer, giving all the steps in an effective maintenance program which will help to keep 'em rolling for the duration

BATTERY-powered industrial trucks, possibly because of their ability to operate longer without proper maintenance than most similar equipment, often are neglected to the point where their normal span of usefulness is seriously impaired before they finally are inspected and overhauled.

Today, such negligence is inexcusable, since during no previous emergency in the country's history have conditions necessitated such rigid maintenance of industrial equipment as now. Regular inspection and overhauling are the only positive guarantees of the continuous, efficient performance demanded by the 24-hour-a-day, 7-day-a-week production schedules now so common.

The following suggestions, then, are designed to facilitate the care and maintenance of the electrical end of this important piece of equipment.

General Precautions

The batteries, sole source of propulsive energy, should be inspected and serviced at regular intervals, according to the recommendations of the battery manufacturers, and replacements made without delay.

Both the traction motor, which propels the truck, and the hoist motor, which drives the pump on trucks equipped with hydraulically operated hoist and tilt mechanisms, or the gear box on gear- or chain-drive hoist and tilt mechanisms, should be inspected monthly and overhauled approximately once a year.

The controller, the commutator, the contactor, the accelerating resistor and all allied parts should also be inspected and overhauled at like intervals. Naturally, local conditions and the skill of the operator will dictate the frequency of inspection and overhauling.

Suggested procedures follow:

Monthly inspection:

1. Remove dirt from commutator cover and surrounding parts to prevent it from falling into the motor.
2. Remove commutator cover and examine mechanism, noting that the copper surface has a smooth polished appearance and is free of copper beads and grease.
3. See that the brush-holder mechanisms seat on brushes and that shunts and terminals are tight.
4. Wipe carbon dust from cables and brush holders.
5. Remove dirt from brushes by lifting springs and raising and lowering brushes in the carbon ways. Do not snap the springs, as this may chip the brushes.
6. Replace short or broken brushes with new ones of the proper grade. If only partial replacement is made grind new brushes to same length as the other brushes in the motor.
7. Inspect connections for tightness.
8. Examine the interior of motor for charred or broken insulation or other injuries and replace damaged parts.
9. Replace commutator cover.

Annual:

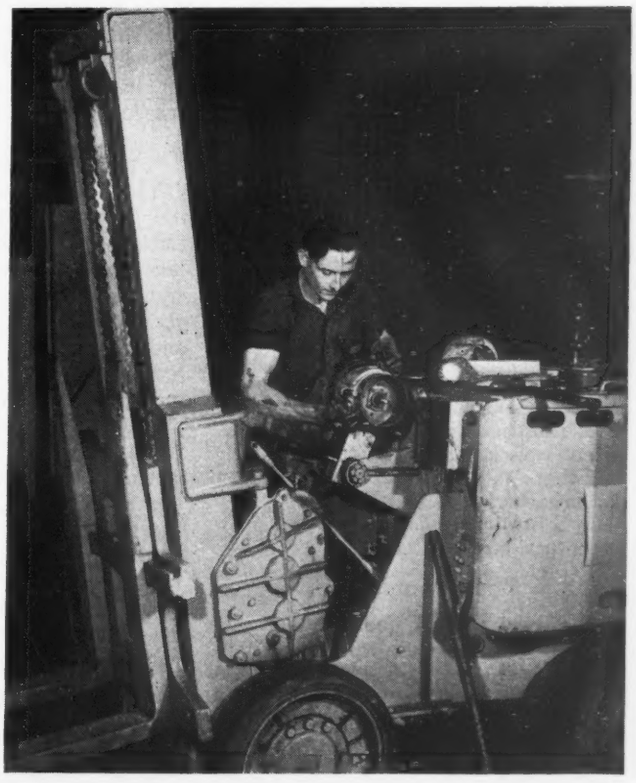
1. Remove motor from truck and clean outside of it.
2. Remove commutator cover and raise the brushes from the commutator to avoid damage.
3. Remove the nuts from the studs at the pinion end of motor and withdraw the armature complete with commutator-end bearing assembly and pinion-end framehead assembly through pinion end.

IMPORTANT: To obtain maximum life from bearings, they must be kept free of dirt. Therefore, when bearing assemblies are removed from motor, keep them covered.

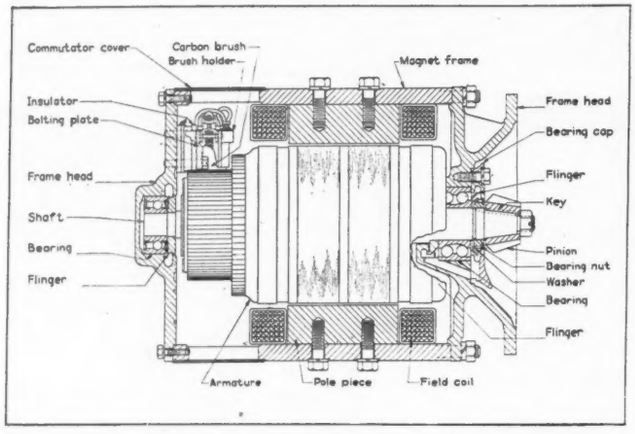
4. Remove the pinion-end framehead assembly and commutator-end bearing assembly from armature, employing suitable puller.
5. Blow out dust and dirt from armature, using clean dry compressed air and wipe clean of oil and grease with a cloth saturated with carbon tetrachloride.
6. If armature is found in good condition, proceed as follows:
7. Bake at least 12 hours at 120 C. (250 F.).
8. While hot, paint with a varnish such as Glyptal No. 1201. Paint the string beads but take care to keep the commutator clean.
9. Bake for twelve hours at 120 C. (250 F.).

NOTE: If it is found necessary to remove armature coils due to grounds, short circuits, or other damage, it is recommended that the complete armature be sent to the nearest service shop for repairs and rewinding.

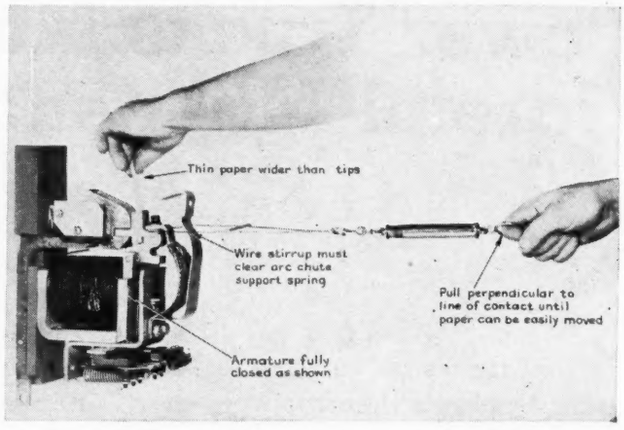
10. Take out the cap screws at the commutator end and remove the framehead.
11. Blow out the interior of motor with clean dry compressed air and wipe clean of any oil and grease with carbon tetrachloride.
12. If field coils are tight and in good condition, paint them with varnish such as Glyptal No. 1201. Also, paint the interior



Checking operation of tilt-motor clutch.



Sectional view of traction motor.


Thin paper wider than tips
Wire stirrup must clear arc chute support spring
Pull perpendicular to line of contact until paper can be easily moved
Armature fully closed as shown

Measuring contact-tip pressure on magnetic contactor.

of the motor with varnish, using care not to get any varnish on the pole-piece faces. Otherwise, remove field coil as follows: Disconnect the cables and remove the cap screws holding field piece to frame. Then slide out the pole and coil through end of frame and slip coil off pole. Keep each pole, coil and any accompanying shims together. Upon reassembly, parts should be returned to their original position, use new lock washers with pole-piece cap screws, make sure that contact surfaces are clean, cables are properly reconnected and cap screws drawn up tightly. Check the coil polarity. Guard against loose connections at all times.

13. Remove dust and dirt from brush holders and cables with carbon tetrachloride.

14. Note that brush-holder mechanisms operate properly, that brushes are free in carbon ways, that shunts and terminals are tight and that carbon ways are not rough or worn. Brushes should never be allowed to wear so short that the pressure arm of the lever rests on the top of the brush-holder carbon way instead of on top of the brush. All brushes must have the same length to obtain an even distribution of current.

NOTE: New brushes may be fitted to the commutator brush holder by placing a strip of fine sandpaper between the end of the brush and the commutator with the rough side of the sandpaper against the brush.

15. Pole-piece cap screws must be tight and locked with lock washers.

16. Reassemble parts on armature. When replacing bearings, use a suitable brass sleeve so that the pressure will be on the inner race of the bearings.

17. Reassemble armature in frame, putting in new brushes if necessary.

The Commutator

The commutator should never be lubricated, since the brushes contain sufficient lubrication. A dirty and greasy commutator will collect carbon dust in the grooves between the segments. This condition will cause a short circuit. The commutator should be kept smooth and concentric with the armature bearings. If the commutator brush surface should become rough, burned, pitted or excessively worn, the armature should be placed in a lathe and the copper turned down just enough to give a true surface. The mica between the copper commutator segments is undercut to $\frac{1}{32}$ in. below the copper brush surface on new commutators and should be undercut as often as necessary to prevent the mica from becoming flush with the copper brush surface. Slightly round all sharp edges on the copper segments after turning or undercutting and remove all chips, sharp edges and copper dust from the grooves between the segments. Care must be taken to prevent the copper chips and dust from lodging in the armature winding while reconditioning the commutator, by using a suitable head covering over the end windings.

Pump Motor

The same procedure suggested for the inspection and overhauling of the traction motor should be followed in the case of those industrial trucks equipped with a motor-driven gear-and-chain or hydraulically operated hoist and tilt mechanism, except for the differences in the method by which the motor is removed or opened.

Details vary according to the particular type of truck involved, but in general it is necessary to first disconnect the coupling between the motor and the pump. The mounting screws may be differently located, but an inspection will make it readily apparent what changes need to be made in the routine as already mentioned in connection with the tractor motor.

The Controller

1. Blow out all dust and grit with clean dry compressed air.

2. If required, oil contact-cam rollers and oil reverser-shaft bearing. Use an accepted lubricant in a long-snout oil can.

3. Replace any broken springs or shunts and check all connections for cleanliness. Tighten if loose.

4. Inspect contact tips for cleanliness and wear and carefully remove any roughness on contact surfaces with a clean fine file. Contact tips worn halfway through should be replaced.

5. At yearly overhaul period, remove, clean and repack main shaft bearings with an accepted ball-bearing grease.

6. Both the contact-tip pressure and the tip gap (distance between the tips when the contactor is open) should be checked periodically.

Contactor

The contactor should be inspected at the same time the controller is inspected, as follows:

1. Use clean dry compressed air to blow out all dust and grit, being sure to blow out all metallic dust from contact points.

2. Replace any worn or broken points.

3. If the contact tips are badly burned, dress down with a fine file. (Do not waste contact metal.) Replace tips when worn halfway through.

4. Inspect cable and shunt connections for loose or faulty electrical contact.

5. Periodically check contact tip pressure and tip gap.

NOTE: Specific information relative to coil operation and contactor adjustment should be obtained from the manufacturer.

Accelerating Resistor

1. Blow out all dust and dirt with clean dry compressed air and check all connections for tightness.

2. Check both resistor ribbon and porcelain insulator for damage or breakage.

From the foregoing, then it is obvious that proper maintenance of this important piece of industrial equipment—maintenance that will largely eliminate expensive breakdowns and replacements—is based solely on the common-sense, but often disregarded, theory of preventing trouble before it starts.

Chemists Adapt Pectins To New Industrial Uses

By CHARLES W. KAUFMAN, ELLIS R. FEHLBERG and AKSEL G. OLSEN
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PART I—Demethoxylation is putting pectins among the useful tools of the food technologist. This article explains how pectins are modified to make them suitable for many uses, including low-sugar jellies, salads, consommes, aspics and puddings

A FEW years ago pectin was thought of as a naturally occurring complex vegetable substance, the use of which was limited to the preserve and jelly industry. Further applications were prevented by the high sugar concentration required by the natural pectins in order to form a jelly. None of the regular pectin jellies could approach the sugar concentration permissible in the salad and dessert field. All were too sweet. Gelatine, agar, starch and similar materials were used because sugar is not a factor in their jelling action. However, for many products these materials had marked disadvantages. For example, gelatine melts at relatively low room temperatures and is subject to permanent liquefaction by heat or long storage in an acid medium.

With increasing knowledge of the chemistry of pectin it became possible to foresee additional industrial applications of the parent material or of some of its modified forms, if such modifications could be effected. Now many modifications have been prepared and some are available in commercial quantities. Among these are types that do not require sugar for jelling. They are relatively stable to heat and storage. The melting point of their jellies can be controlled. They therefore appear to be tailor-made for certain types of salads, consommes, aspics, puddings, and the like.

The Pectin Molecule

Recent work tends to suggest that natural pectin, regardless of source, is a "macromolecule," a very large molecule built up of a series of simpler units. The pectin macromolecule is believed to have a long chainlike structure, as represented in Fig. 1. The relationship of the chain units to the sugar galactose is shown in Fig. 2.

The units of the long chain are six-member rings, with five carbon atoms and one oxygen. The characteristic side chains are methoxyl groups, $-COOCH_3$, or the corresponding acid, $-COOH$. The methoxyl groups are readily hydrolized by chemical treatment or by enzyme action, yielding in each case the free acid. The extent to which this change has progressed is indicated by the "degree of methoxylation" or the "degree of acidity" of the molecule, that is, the ratio of the methoxyl or acid groups present to the total number of side chains.

The free acid groups are readily neutralized, giving metallic salts of the pectic or pectinic acids. Since the combining or equivalent weight is the weight of pectin which will exactly neutralize one equivalent of standard alkali, that is, 40 grams of sodium hydroxide or 56 grams of potassium hydroxide, it can be determined by titrating 1.00 gram of pectin with standard alkali solution and calculating to the above basis. As the percentage of methoxyl goes down, the acidity is increased and the combining weight is lowered proportionately. Equivalent weights for natural pectins range from about 200 to 1,100, but the normal range for commercially extracted pectins is from about 500 to 1,000.

A completely demethoxylated molecule containing nothing but free acid groups would be designated as pectic acid, which in a crude state would have an equivalent weight of about 200, while intermediate products would be designated as pectins or modified pectins, depending on the degree of acidity. A product containing a very small percentage of acid groups would have an equivalent weight of perhaps 1,160. In scientific literature products containing both methoxyl and acid groups are referred to as pectinic acids.

A high grade natural pectin may have a molecular weight of over 200,000. This means that well over 1,000 units may be strung together to form each molecule. This accounts for the viscous nature of pectin solutions. Such molecules may be split into shorter fragments of correspondingly lower molecular weight, lower grade, and lower viscosity, yet of essentially identical chemical composition.

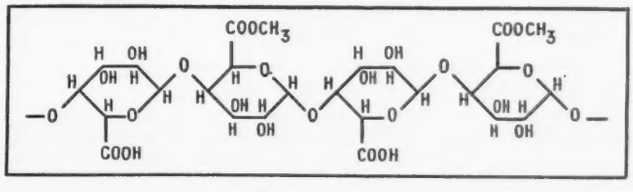


FIG. 1. Four units of a pectinic acid molecule, showing linkages through the oxygen atoms.

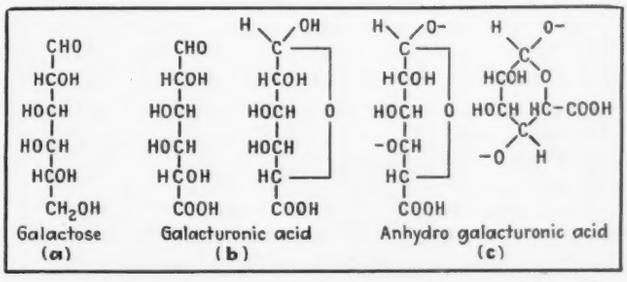


FIG. 2. Relationship of pectinic acid to galactose, a simple sugar. (a) Galactose, showing the usual straight chain sugar structure. (b) The acid form, showing the straight chain on the left and the same molecule with an inner oxygen linkage on the right. (c) The "anhydro" acid, showing the inner oxygen linkage, and then the same compound in the ring form as used in the pectin molecule diagram.

Having in mind the well known relationship of size and shape of molecules to physical properties such as viscosity in solution, the relation of molecular size to the properties of pectin is readily apparent. It should also be apparent that the degree of acidity of a molecule of pectin may profoundly effect its behavior. Nevertheless, little has been done in the past to interpret pectin behavior in terms of the degree of free or combined acidity of the molecule. That pectins may vary in their acid properties was recognized prior to 1850 when Fremy and others independently reported the existence of several "pectinic acids." About the same time, other workers reported preparing the metallic salts of such acids.

Preparation of Modified Pectins

A major difficulty preventing systematic study and industrial development of modified pectins or "pectinic acids" had been the absence of a suitable method of preparing them. Although differences in degree of methylation were recognized, pectin preparations were accepted as they occurred naturally, or the methoxyl groups were stripped off to produce the completely non-methoxylated pectic acid. The latter was usually obtained by alkaline hydrolysis and had invariably lost, to a large degree, the colloidal properties of the original long-chain molecule. A process developed by Olsen and Stuewer and patented in 1938 made it possible for the first time to prepare pectinic acids of any desired average combining weight, and permitted a study of the properties of these modified pectins with a view to their ultimate industrial use.

Present knowledge makes it apparent, therefore, that pectins may vary independently in chain length and in degree of methylation. The former determines such properties as grades and viscosities; the latter, such characteristics as setting time, acid requirement, sugar tolerance, reactivity with metallic ions, and so forth. The correlation between the combining weights of pectinic acids and their characteristics have been fully reported by Olsen, Stuewer, *et al.*[2] Within the scope of the present paper, the most important characteristic upon which they reported was that as the combining weight dropped from 800 to 300, the corresponding pectinic acids showed an increasing sensitivity toward metallic ions and a decreasing sugar tolerance, or "minimum sugar requirement."

By minimum sugar requirement we refer particularly to the older types of pectin where sugar was essential for proper jell formation. When pectins are prepared from naturally occurring sources, such as citrus fruits or apples, with no further treatment other than extraction, they require a certain balance between sugar, acid and pectin before jellies will form. It is this lack of balance that prevents many fruit juices from being naturally jellying, inasmuch as the pectin content is high enough to form a jell under proper conditions. With pectins prepared by direct extraction from citrus fruits, it is essential that at least 42 percent sugar be present before jell formation will occur. Even then the jelly is of poor quality because that figure represents the minimum sugar requirement. Better jells would be formed from the same pectin at 55 to 65 percent sugar.

TABLE I—Effect of Equivalent Weight on Sugar Requirement of Pectin Jelly.

Equivalent weight*	Methoxyl (percent)	Approximate minimum sugar concentration (percent)	Usefulness for jellying 60% sugar	30% sugar	No sugar
700	9.6	42	Yes	No	No
550	8.8	42	Yes	No	No
425	7.3	42	Yes	No	No
350	5.8	20	No	Yes	No
320	5.0	0	No	Yes	Yes
290	4.5	0	No	Yes	Yes

* Amount of pectin required to neutralize one equivalent of calcium, that is, 20 grams of calcium.

TABLE II—Effect of Equivalent Weight on Calcium Jelly Forming Power of Pectin.

Equivalent wt.	Jell strength (degrees)
335	250
319	300
310	375
305	480

TABLE III—Effect of Molecular Size, as Indicated by Viscosity, on Calcium Jelly Forming Power of Pectin with Equivalent Weight of 305.

Equivalent wt.	Viscosity* 1%/15°C.	Jell strength (degrees)
305	8.27	480
305	2.34	100
305	1.44	80
305	1.10	60

* Flow time for water=1.00.

Calcium Jellies

Olsen and Stuewer's work suggested a means of reducing the sugar requirements for a pectin jelly by utilizing the metal reactivity of the low equivalent weight pectins, particularly the reaction with calcium, which in the case of low equivalent weight pectins causes jelly formation independent of the sugar concentration. The effect of such a metal-sugar substitution is shown in Table 1. In determining these pectin-sugar jelly relationships, appropriate amounts of calcium salt were added.

These relationships show that at equivalent weight below 400, the pectin becomes increasingly reactive toward calcium, as measured in terms of minimum sugar requirement, and that accordingly jellies containing little or no sugar can be formed with them. At the same time they become progressively less suitable for the usual high-sugar jellies.

Three other factors have been found to be important in the formation of such low sugar jellies:

1. *Calcium*—While any calcium salt will function to form the low-sugar jellies, the soluble calcium salts are not desirable. They supply calcium ions at such a rate that the jelly curdles or precipitates. The less soluble phosphates, citrates, carbonates, and so forth, overcome this difficulty by reacting more slowly with the pectinic acid, permitting better control of the reaction.

2. *Acidity*—Unlike regular pectin jellies, acidity or pH control is not essential for low-sugar jelly formation. Jellies have been prepared ranging in pH from 2.5 to 6.0. However, the rate of set, and to some extent the texture, is controlled by the pH.

3. *Salt Effect*—The concentration of certain soluble salts appears to exert a marked control on the melting point of the jellies, as well as on the rate of set. By controlling the salt content a jelly can be prepared which will be capable of remelting and remodeling as many times as desired.

The strength of a low-sugar pectin jelly has been shown to be dependent on two factors besides acidity: the equivalent weight of the pectin and the molecular size of the pectin. A method has been developed in this laboratory for grading low-sugar jellies, using the Bloom gelometer.* Because of the variety of jelly textures encountered in low-sugar jelly work, this instrument has proved much more adaptable than the Tarr-Baker tester which has been used for most high-sugar jelly tests.

Based upon this system of grading, the effects of equivalent weight on jell strength are shown in Table II; the effects of molecular size, as indicated by the relative viscosities are shown in Table III.

Other Metallic Salts

Thus far we have considered only jellies formed by combinations of low equivalent weight pectin and calcium ions. We have also found it possible to produce jellies with similar properties using magnesium salts instead of cal-

* The Bloom gelometer is the standard instrument for measuring the strength of gelatine. The Tarr-Baker instrument was designed at the Delaware Experiment Station for use in connection with the measurement of strength of fruit jellies.

(*Turn to page* 109)

There Are Two Parts To a Fire-Bomb Blaze

By WILLIAM H. EASTON
Safety Research Institute, New York, N. Y.

Different methods must be used to combat the incendiary bomb and the outlying fire. The most effective way of dealing with both fires must be taught to employees of all food industries in the "target area"

MOST food plants located in "target" areas probably have made preparations for dealing with incendiary bombs. But it is even more important to be ready to cope with the fire started by the bomb, for there is where the real danger lies.

From a fire-fighting standpoint, a fire started by an incendiary bomb should be considered as having two parts—one consisting of the burning bomb and its immediate surroundings, which may be called the "bomb-fire," and the other consisting of the remainder of the blaze, which may be called the "outlying fire."

This division is important because the impression has become widespread that all of a fire started by an incendiary is of a special nature and can be fought successfully and safely only by the use of special methods. This is not the case. Only the bomb-fire calls for special treatment. The outlying fire is simply an ordinary fire and should be fought with regular weapons in the regular manner.

In practice, when an incendiary fire is started, one man should be assigned to the bomb-fire, while all others on the spot attack the outlying fire, if it is of serious dimensions, with any kind of fire-extinguishing equipment that will put it out.

In fighting the bomb-fire, the operator's objective is to get rid of the burning mass of metal as quickly as possible in order to eliminate it as a source of ignition. The simplest way to do this is to cover the bomb with some preparation approved for extinguishing burning magnesium. But if no such material is available, or if the operator is unable to reach the bomb, he must employ other means, which will depend upon the kind of combustibles involved in the bomb-fire.

If the combustibles in the immediate vicinity of the bomb are of the ordinary type, such as wood, paper or textiles, as will usually be the case in most food plants, the operator disposes of the bomb with water in accordance with the OCD-approved technic, using for this purpose a hose stream or any of the water-type fire extinguishers – pump tank, soda-acid, foam, gas cartridge or loaded-stream. Some experimenters suggest disposing of the magnesium bomb by submerging it in a pail of water. However, this method is not generally recommended—at least in official circles. The official recommendation of the Chemical Warfare Service and the OCD is to use a jet, or solid stream, of water.

Since the bomb flares up when water strikes it, easily combustible materials near the bomb may have to be wet down, to prevent additional fires from being started.

Neither vaporizing-liquid nor carbon-dioxide extinguishers should be used on burning magnesium bombs, because neither contains water and consequently is not effective on burning magnesium. Both, however, may be used on the outlying fire without restriction after the bomb has been extinguished.

When the bomb-fire involves oil, gasoline or other flammable liquid that has been spilled or is in an open container, the best weapon to use is either a foam or a loaded-stream type of fire extinguisher, since both will speed up the burning of the bomb and will subdue the fire in the liquid as well. The use of vaporizing-liquid and carbon-dioxide extinguishers should be reserved for parts of the fire that will not be re-ignited by the burning bomb.

When an incendiary that has not been previously ignited lands in either an open or a closed container holding more than a foot of flammable liquid, it will ordinarily be smothered in the

(*Turn to page* 107)

This is the small magnesium bomb, which would more properly be called a "fire starter." More dangerous than the bomb is the fire it can start.

Workers must be trained to put out the small fires the fire bomb may start, and also to dispose of the bomb. Actual drills should be held so the men will be trained to act promptly and intelligently in an emergency.

Truck Property Sheets Control Repairs

Clever truck numbering scheme indicates type, tonnage and age of all units in the fleet

FOOD field truck distribution costs are composed of many factors, neglect of any one of which will result in high unit costs. These costs start with the purchase of the motor unit and its body, continue through with the cost of maintenance and repair and the cost of operation, and finally end up with the disposal of all or part of the unit.

The two previous articles on the operation of the fleet of trucks of Foremost Dairies, Inc., Jacksonville, Fla., as published in the August and September, 1942, issues of FOOD INDUSTRIES, dealt with the physical equipment utilized in the control of the fleet and the daily master control sheet employed to get the essential operating facts on paper.

This article has to do with certain details in the use of those controls to assure a low final distribution cost for both milk and ice cream trucks.

In arriving at the total cost of fleet operation, it is possible to build up that total by adding the following costs: Total monthly bills for gasoline, oil, repair parts and tires; shop and supervisory payrolls and driver and helper payrolls; and the fixed charges of depreciation, licenses, taxes, and so forth. The total charges for depreciation, licenses, and so on, must be obtained by totaling the expense of such items for each individual unit.

Determining Unit Costs

However, if the total fleet cost is considered too high, there is no way to find out and prove what causes the high expense except to dig back into the cost of individual units. To obtain this individual unit cost it is necessary to break up the monthly bills for gasoline, oil and tires and charge to each unit its proper share of the cost as determined by totaling the quantities used and the miles run by each individual unit. To economically record such costs, it is necessary to provide a cost sheet for each vehicle.

For any given month, the total expenses of all individual truck sheets should equal or balance the total bookkeeping expense as carried on the company's books.

For ease in recording individual truck costs and to facilitate their subsequent use by the head of the automotive department to effect savings, it is customary to assign a number to each vehicle and to head up the individual truck cost sheet with that number. With a small fleet, all operated from one plant, this is simple enough. But when the size of the fleet increases to several hundred vehicles and these are purchased and used by several independent plants or branches, the simple item of vehicle numbers becomes quite confusing in trying to control individual truck costs from a central headquarters.

Unless some simple but comprehensive system of numbering is set up in advance, the usual procedure for each plant or branch is to number the first truck in use as No. 1 and continue up in order as additional vehicles are added. If 5 years later, No. 1 truck is disposed of, a new truck to replace it may be given a new No. 1.

Form T-1 Vehicle No. 139 (Old No 39)

FOREMOST DAIRIES, Inc.

MOTOR VEHICLE RECORD

Owner Foremost Dairies Inc City Jacksonville, Fla.
Make CHEVROLET Year 1936 Model Master Wheelbase 131 in.
Motor No. 6-180-433 Serial No. 8RA10-1688 Key No. AB-14651
New or Used Used Date into service April 1 1936
No. Cylinders 6 Size Cylinders 3 15/16" x 4" SAE Hp 27.4
Cu. In Displacement 207.0 Gas Tank Capacity 16 Gals.
Rated Capacity 1 tons Vehicle Weight lbs.
Tires, Kind Pneumatic Body Weight lbs.
Front 6.50 x 20 Ply 8 Total Vehicle Weight 3900 lbs.
Rear 7.50 x 20 Ply 8 single Allowable Load 2000 lbs.
Body Type Panel (No separate cab) Gross Weight, Loaded 5900 lbs.
Body size, inside: Length 9'10" Width 5'2" Height 4'6"
Truck purchased from Downtown Chevrolet Co
City Jacksonville, Fla.
Body purchased from Body transferred from 1931 Chevrolet #81
City
Helper springs NO Rear Axle ratio 5.43 to 1
Type of brakes Mechanical Booster NO
Remarks Milk truck, 92 cases
Painted: Hood & body cream; Fenders red.

Foremost Title No. 1-300-035A

Speedometer 99804 on 5/24/41 EXPIRES January 15th

Year	State	License No.	Cost	Year	State	License No.	Cost
1941	FLA	2-GK-1880	$ 30.75*	19			$

* includes tax of $1.50

Reproduction of the Foremost Dairies, Inc., Motor Vehicle Record, giving the physical data on Truck No. 139, old No. 39. Note that the sheet has provision for license data for 12 years. The diagonal line across the sheet indicates that the truck has been sold and disposed of.

Also, when a company has nine plants, each with, say, five trucks apiece, each numbered from No. 1 to No. 5, the headquarters office records would show five No. 1 trucks, five No. 2 trucks, and so on, with no uniformity as to make, size or age between each group of trucks carrying the same number.

To overcome the confusion and inconvenience of individual-truck cost keeping under the conditions outlined above, Foremost Dairies, Inc., late in 1941, introduced a new scheme of vehicle numbering in which the number itself indicates the kind of work done by the truck or the type of vehicle, the capacity or size of the truck, and its age relative to the other units of the fleet.

The key to the numbering scheme is given in the accompanying table. It provides separate numbers for a total of 900 vehicles. In order to give the impression of a large number of vehicles in the fleet, no two-digit number or no number under 100 is used.

A total of 400 numbers is provided for trucks used for milk deliveries, these being divided at 200 for trucks of 1-ton capacity and under as nominally used for retail deliveries and 200 for trucks of 1½ tons and over as nominally used for wholesale deliveries.

By assigning the lowest number in each group to the oldest unit in that group, the relative ages of all other trucks in that group are at once made apparent. When a truck is disposed of, its number is not reissued to the new truck replacing it.

The vehicle number on Foremost Dairies, Inc., trucks is placed at three points—on the side of the motor cowl, on each side, and one on the rear end, so that it can be identified from the rear or either side. Number on right side of cowl may be seen on this vehicle.

Form T-2

FOREMOST DAIRIES, Inc. Vehicle No. 139 (Old No. 39)

MOTOR VEHICLE PROPERTY ACCOUNT

Owner Foremost Dairies, Inc. City Jacksonville, Fla.

COST			
Chassis & Cab	$ 450.00	Station Jacksonville, Fla.	
Accessories		Make CHEVROLET	Year 1936
Delivery Charges		Model Master	Tons Cap. 1
Taxes (not license fee)		Motor Nos. 6-180-433	
Less Tires			
Net Chassis	$ 450.00	Serial No. 8 RA 10-1288	
Body, including accessories, painting and lettering		Purchased new or used	Used
Delivery Charges Body Transferred from Chevrolet #81		Date Purchased	April 1 1936
Taxes (not license fee) (1931)	100.00	Purchased from Downtown Chevrolet Co City Jacksonville, Fla.	
Net Body	$ 100.00	Body Purchased from Transferred from 1931 Chevrolet # 81	
Total, Net Chassis and Body	$ 560.00	City	
DEPRECIATION RATE		Date Body Purchased	April 1 1936
Chassis and Cab	4 Years		
Body	4 Years		

DISPOSAL DATA

Date Sold	August 29 1941
Sold to	Burwell Motor Co
	924 Laura St
City	Jacksonville, Fla.
	Traded in on our Chevrolet Truck No. 64
Cost (less tires)	$ 550.00
Depreciation charged	550.00
Sound Value	$ 0.00
Trade-in Value or amount realized	50.00
Profit or Loss	$ 50.00

DEPRECIATION RESERVE

Year	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1936	—	—	—	11.45	11.45	11.45	11.45	11.45	11.45	11.45	11.45	11.45	103.05
1937	11.45	11.45	11.45	11.45	11.45	11.45	11.45	11.45	11.45	11.45	11.45	11.45	137.40
1938	11.45	11.45	11.45	11.45	11.45	11.45	11.45	11.45	11.45	11.45	11.45	11.45	137.40
1939	11.45	11.45	11.45	11.45	11.45	11.45	11.45	11.45	11.45	11.45	11.45	11.45	137.40
1940	11.45	11.45	11.45	—	—	—	—	—	—	—	—	—	34.75
													$550.00

Foremost Form T-2 showing the original cost of Truck No. 139 and its body at $550 and its disposal value at $50 after being fully depreciated, thus indicating a book profit of $50. Note also the amount of depreciation to be charged into truck expense each month over its depreciated life.

Truck Numbering System

Group, quantity	Designating numbers	Classification
	MILK TRUCKS	
A, 200	100 to 299	1 ton and under
B, 200	300 to 499	1½ tons and over
	ICE CREAM TRUCKS	
C, 100	500 to 599	1 ton and under
D, 100	600 to 699	1½ tons and over
	OTHER VEHICLES	
E, 100	700 to 799	All tractors
F, 100	800 to 899	All tractors
G, 100	900 to 999	All passenger cars
Total, 900 vehicles		

The same assigned vehicle number as above determined is used on the Motor Vehicle Record and Motor Vehicle Property Account sheets, forms T-1 and T-2, reproduced herewith.

Forms Used

Form T-1 gives the essential physical data on the truck. Form T-2, with the total depreciation for truck and body figured by months in dollars and cents over the depreciated life of the unit, is used to determine when major repairs should or should not be made and how much should be realized at time of disposal to prevent a book loss. The Depreciation Reserve chart indicates the month and year at which the vehicle is fully depreciated.

The already-calculated monthly depreciation is used as the expense for this item on the individual-truck cost record.

New Sweetener From Apples —Method for Making It

By a simple process there can be made from "juice" grade apples sugar sirup that is very sweet, bland and suitable for use in foods. The sugar shortage makes this new sweetener of particular value. The equipment needed to make it should be available

A SUGAR sirup that is very sweet, bland, and with no distinctive color or flavor to complicate its use, can be produced from apples by a simple process, according to the Eastern Regional Laboratory.*

The product has been tested and found commercially acceptable. The process is still in the "semi-plant scale" stage, worked out on 15-gal. runs, but the transfer to plant operation is not yet accomplished. Although certain details need further study, the main features are established and it is believed to be practicable for commercial operation. The laboratory is continuing work on the process.

Apple juice contains about 11 percent sugar, of which a large proportion, 58 to 75 percent, is levulose. Dextrose and sucrose in about equal amounts make up the balance of the sugars. The high levulose content is an advantage in that the sirup is very sweet, 20 to 30 percent sweeter than a cane sirup of equal sugar content. It is a disadvantage, also, due to the impossibility of crystallizing levulose.

The sirup as now produced is evaporated to 75 percent solids. It can be refined to a very light color, with elimination of apple flavor, and is then somewhat similar to commercial invert sugar.

Uses of Apple Sirup

Although this sirup contains the same sugars as honey, it has more levulose and sucrose, and less dextrose. It should, in general, be satisfactory where honey can be used, but because it has no distinctive flavor, it should also find uses for which honey is unsuitable.

According to the Laboratory, as a sweetener for food, apple sirup will be superior to corn and sorghum sirups, about equal to maple sirup, and somewhat inferior to invert sirup and honey. Being a new product, the extent of its market is not known. Samples are being supplied for test in a number of food products, and it is believed that a market exists for its use in ice cream and in confectionery. It has already proved an excellent sweetener for fruit pie fillings and is expected to find many other uses in bakery products.

Several companies have tried it as a conditioner in tobacco, with satisfactory results, and they now want to have a source of supply developed. This use depends on its hygroscopic property and on the fact that levulose burns well.

There are other fields for which it is not suited. The cost would probably prevent its use for preserves, and for low-priced beverages. For beverages it has the further disadvantages that its flavor is sometimes apparent when considerable quantities are used, and that the phosphates and nitrogen compounds will serve as nutrients for microorganisms in unpasteurized beverages.

It is probably too sweet for a table sirup, although excellent for domestic cooking.

Production

It is estimated that in a normal year there should be enough sound but unmarketable apples throughout the country, exclusive of those normally used for apple juice concentrate, to produce one or two million gallons of this type of sirup. The limiting factor in regard to possible production now is available equipment, particularly evaporators.

The overall manufacturing cost, based on 1942 production costs on vacuum-concentrated apple juice, should be about 60 to 70 cents per gallon. One ton of fruit is estimated to yield about 21 gal. of 75-deg. Brix sirup, so that the raw-material cost for a gallon of finished sirup is 4.7 cents for each dollar per ton paid for apples. Filter aid, lime and sulphuric acid are estimated at about 1 cent per gallon of sirup. Used wine or whiskey barrels add 3 cents per gallon. To these costs must be added labor, factory and administrative overhead, selling and delivery. It will be seen that rather low-priced apples must be available to compete with the usual sources of sugar.

A "juice" grade of apples, consisting of fruit that is sound but perhaps off-grade because of color, size, shape or surface defects, is satisfactory. Federal laws prohibiting the use of unsound apples in food products necessitate sorting to remove any unsound fruit.

How to Make It

The proposed process is shown on the accompanying flow diagram. The equipment needed, with the exception of the evaporator, should be available. If vacuum evaporators can not be bought, it will perhaps be possible to locate evaporators which are not in use during the apple season and which can be utilized in this way.

The apples must be carefully sorted to make sure that no unsound fruit enters the product. Very immature and overripe fruit must be avoided, the former because it has a low sugar content, and the latter because it is difficult to handle in a hydraulic press. Apples may contain appreciable quantities of spray residues, which find their way into the juice upon extraction and are concentrated in subsequent treatment. A special hydrochloric acid wash therefore follows the sorting, and this in turn is followed by a water wash.

In addition to sugars, apple juice contains small amounts of malic acid, tannin, pectin, amyl esters of formic, acetic and caproic acids, soluble salts, coloring matter and nitrogenous substances consisting of enzymes, proteins and possibly some free amino acids. Most of these must be removed in processing, as it is these substances which give flavor, odor, color and jelling properties.

Clean, sound apples are ground and the juice is extracted in a hydraulic press. The flow diagram shows a second pressing of the pomace, which can be dried for commercial use. The juice from this second pressing is added to the original filtrate.

* M. A. Bradshaw and H. H. Mattern, "Production of a Bland Sirup from Apples", Eastern Regional Research Laboratory, United States Department of Agriculture, Mimeographed Report ACE-180, July, 1942.

The press juice must be brought to pH 7.8 to 8.2, and for this a lime slurry containing 1 lb. of hydrated lime per gallon of water is used. The juice must be kept above 78 deg. F to avoid possible precipitation of a lime-sucrose compound. Vigorous stirring is required during liming to prevent localized action of the lime on the invert sugars. It is suggested that a glass-electrode pH meter with extension leads be used for control of liming, although other indicators can be used.

The lime-treated juice is heated to 175 deg. F. to accelerate the action of the lime on the pectin.

Suspended matter is removed in a filter press, using approximately 4 lb. of a diatomaceous filter aid per 100 gal. of juice. The clear, dark-brown filtrate is acidified to pH 5 to 5.5, with dilute sulphuric acid (1 volume of U.S.P. concentrated acid added to 3 volumes of water). The acidified juice is very light straw color. It can be further clarified by filtering again with activated carbon, if desired.

The clarified juice is evaporated in a vacuum pan to about 75 percent solids. Excess foaming is avoided by adding about ⅔ oz. of corn oil or other bland oil per 100 gal. of juice.

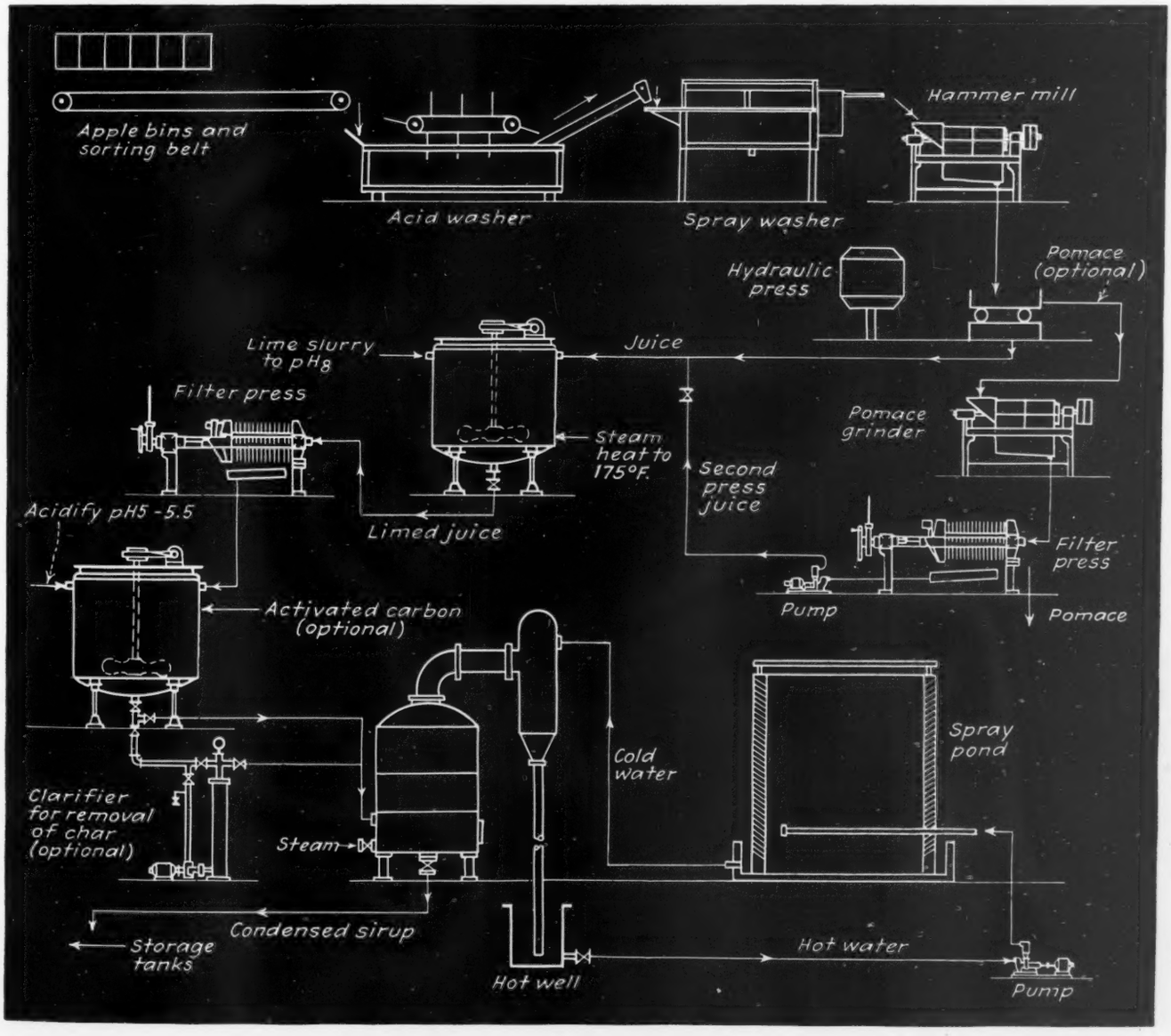
A vacuum of 25 in. is required, at least during the finishing stages, since with a lower vacuum the boiling temperature will be high enough to darken the sirup and give a poor flavor.

Because under present conditions it may not be possible to get exactly the type of evaporator desired, several suggestions are offered. In the laboratory a stainless steel double-bottom vacuum pan was used and found satisfactory. Three runs in a small copper pan showed only 26 parts per million of copper in the sirup from the last run, which is not considered excessive, especially as the sirup had no metallic flavor. An ordinary steel evaporator should not be used as it would probably contaminate the sirup with iron.

A calandria should be satisfactory, provided the rate of flow through the tubes is sufficient to prevent local overheating during the finishing stage.

Multiple-effect evaporators have a relatively high boiling temperature in the first stage, which may give poor-flavored juice. Also, it is usually difficult to concentrate to 75 deg. Brix in them.

The Laboratory processed 15 gal. of juice in each run, filtering the limed juice through 8 surfaces of a 10x10-in. aluminum plate-and-frame filter press and concentrating in a 15-gal. pan, producing about 2.5 gal. of finished sirup.



Flow sheet for the manufacture of bland apple sirup

Photos courtesy Rath Packing Co.

PICTURES OF PROCESSES

Take a look at the operation which showed the automobile industry how to do a detailed job fast and efficiently. The cutting room of the meat packing industry led the way in mass production. It is a high-speed assembly line in reverse, a disassembly operation. The packer adds but little to the cost of a pound of meat, thanks to his efficiency. And in his methods other food processors may find ideas that will help them to cut their costs. Rath Packing Co.'s operations are shown here.

1. After a motor-driven dehairing machine removes all but a scattering of hairs, the hog carcass is dipped into resin. As this resin coating is stripped away by an easy tug, the remaining hair goes with it, leaving the hog clean. The skin is a valuable commodity, the Rath plant selling 50 to 60 cars of pig skin a year.

2. As the hogs continue their travel on the overhead monorail, they pass through a cleansing spray of water, immediately after the resin dehairing operation. This is the hog's last appearance as one piece before it starts through the highly efficient disassembly line which was industry's first example of high-speed mass production.

3. After the carcasses are cut open, the viscera are removed and placed in sterile stainless steel trays. The carcasses continue along the overhead conveyor and the viscera are carried in a parallel line at the same speed. This keeps all parts of the hog together until examined for disease by government inspectors. Carcasses unfit for the table are shunted from the production line.

4. A man handy with a cleaver splits the carcasses into two parts as they continue their steady travel down the disassembly line. One of the reasons for efficiency is that movement along the line never stops.

5. After the carcasses have been chilled in the cooler to remove the animal heat and make the meat firm for fast and accurate cutting, the sides of pork are cut into parts by a large power-driven circular saw.

6. Power hand saws, counterweighted to make them light, do the heavy secondary cutting operations, such as severing the ribs so the loin can be taken out.

7. With the ribs cut, it is an easy, if highly skilled job to scoop out the loin with one smooth stroke of a curved, two-handled knife. Within three minutes after the hog

PHOTOGRAPHY BY TORKEL KORLING

reaches the cutting line, the loins intended for shipment will be wrapped in paper, boxed and on their way to refrigerator car.

8. The cutting line has many branches. On this branch the bacon is carried to the cutters and the fat is shunted off to make lard.

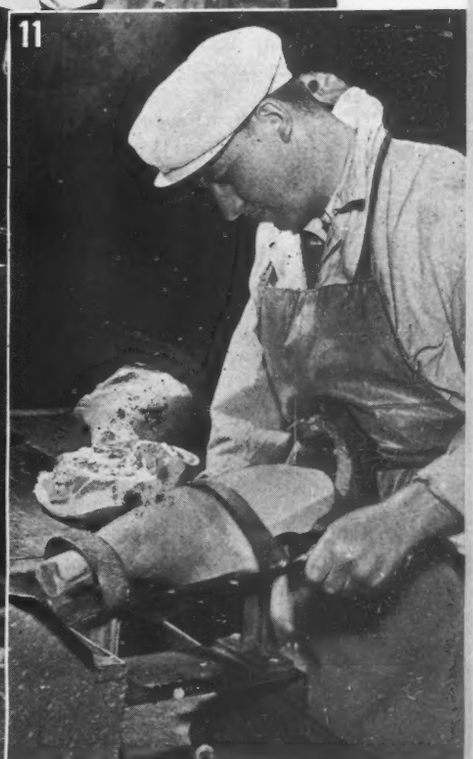
9. Close-up of the bacon trimming operation, in which the trick is to take away only the right amount of fat. It's easy for the men who know how. In Rath's cutting department, 350 people have a hand in taking a hog apart.

5

4

10. Another branch of the cutting line, where women perform the secondary operations. Rath's cutting line handles an average of 5,000 hogs a day, or about 600 an hour. When the rush is on it may hit a pace of 1,100 hogs an hour.

11. Putting the finishing touches on a ham with the aid of a holding device and a curved, two-handled knife. The trick is to take off just the right amount of fat.



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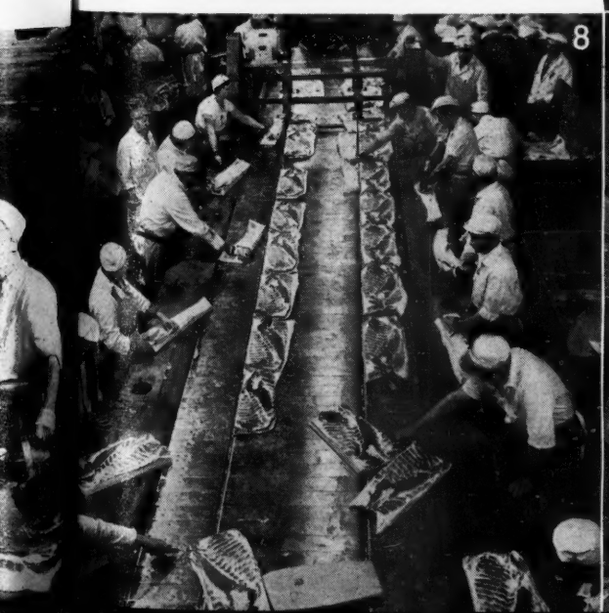

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9

Frozen Desserts Need The Right Stabilizer

By B. I. MASUROVSKY
Consulting Dairy Technologist, New York, N. Y.

Because they use fresh or frozen fruits for flavor and little or no butterfat, sherbets and water ices are important now among frozen desserts. But a smooth texture is essential. The author discusses the use of lecithin to assure smoothness in these products

IN the manufacture of commercial frozen desserts, stabilizers are used not merely to keep the solids together or to check the formation of large ice crystals during the hardening process. In ice cream they improve the viscosity and surface tension of the complete mix prior to freezing, facilitate the whipping of the mix during the freezing process, and assist in retention in the frozen product of the incorporated air cells. Furthermore, the melt-down properties are influenced by the stabilizing agents. Some of these stabilizers congeal the melted ice cream into a gel while others allow it to melt down into a creamy consistency with an abundance of foam floating on the surface.

One of their most important functions is to stabilize the emulsion of butterfat which is brought about during homogenization prior to freezing.

In other words, an ideal stabilizer for ice cream must meet many conditions involved in all stages of manufacture of a frozen dessert, during pasteurization, homogenization, cooling, freezing and hardening, also during handling by the ice cream dealer and the ultimate consumer.

The following materials are among the stabilizers available for frozen desserts: gelatine, gums, algins, cereals and lecithin-bearing materials like egg yolk solids and soybean phosphatides.

Considerable experimental work has been done with gelatins derived from ossein and other animal sources, with vegetable material obtained from kelp and Irish moss, and with gums of different sources. Comparatively little has been done with lecithin or lecithin products as stabilizing agents, although lecithin's value as a colloid stabilizer is well recognized.

Lecithin occurs in small quantities in all living cells, and usually appears in association with fatty substances. It is found, for instance, in the following percentages:[1] Egg yolk, 9.4; liver, 2.1; blood, 1.8; leguminous seeds, 0.8-1.64; cereals, 0.25-0.53.

Commercial vegetable lecithin is obtained from soybeans. It is a mixture of lecithin products and about 25 percent soybean oil.

Previous Findings

It will be useful to review some reports in the literature on the use of lecithin in ice cream mixes. Dr. Walter V. Price[2] pointed out a possible relationship between lecithin and the development of swell. Dr. Randall Whitaker[3] indicated that when the lecithin which has been removed from the cream in churning is replaced by the introduction of buttermilk or egg yolk, both of which contain lecithin, the replacement "restores the whipping properties of the butter mix". Urbain and Miller[4] found that the emulsifying properties of egg yolk lecithin are altered by freezing and thawing, but that the presence of 10 percent by weight of dextrose or levulose prevented the coagulation.

In an exhaustive study of the effects of egg products, soybean lecithin and buttermilk on the whipping properties of ice cream mixes made with butter and dried skim milk, Walts and Dahle[5] show most beneficial results from the addition of egg lecithin. Johnson and Dahle[6] conducted experiments on the membrane surrounding the fat globule, which is essential for normal whipping of ice cream mixes and which they found to consist of a protein-phospholipid. They used milk phospholipids, egg phospholipids and ordinary commercial lecithin as emulsifiers. Their results were in favor of the milk phospholipids.

Recently Bryan[7] tested the effect of soybean lecithin and lecitho-proteins in the manufacture of ice cream. He found that a combination of 0.01 to 0.025 percent lecitho-protein and 0.15 percent glyceryl monostearate gave a satisfactory product. Alan Leighton,[8] examining the relationship of temperature and overrun in ice cream mixes, pointed out that the phase of incipient churning of butterfat during the whipping and freezing processes reduces the amount of overrun obtained with a mix. Lecithin-protein combinations stabilize the butterfat and insure proper whipping and prevent incipient churning of the homogenized ice cream mix during the freezing period.

Lecithin Improves Ices

Not much work has been done with lecithin or lecithin products in connection with the manufacture of water ices and sherbets. It is known[1] that when purified lecithin is mixed with a small quantity of water, the lecithin particles swell up and form threads (myelin forms). When an excess of water is added, the gelatinous mass will "dissolve," forming a milky colloidal solution which is not coagulated by boiling.

The author investigated the behavior of purified lecithin obtained from soybeans as a possible stabilizing agent for making ices and sherbets. The preliminary work consisted of experiments of purely laboratory nature.

The first step was to test the effect of lecithin in a sugar solution by adding 1 percent to a 25 percent sugar solution and comparing it with a similar solution containing no lecithin. Equal portions of both solutions were frozen at a temperature of −15 deg. F. and then allowed to melt at room temperature. The sample containing lecithin melted more slowly and the ice crystals were somewhat finer in size than those of the check sample.

Percentage of Stabilizers Used in Basic Water Ice Mixtures
(Sugar 24%, corn sirup solids 10%)

Series No.	1	2	3	4	Control
Lecithin	0.3	0.3	0.1	0.15	...
Algin	0.2	...	0.2	....	0.2
Gelatine	...	0.2	0.2	....	0.2
Oat flour*	...	...	...	0.35	0.1

*Avenex

A series of samples were made up with 24 percent cane sugar and 10 percent corn sirup solids, to which were added 0.5 percent of one of three stabilizers: purified lecithin, gelatins, or pectin. All samples were frozen at −15 deg. F., then allowed to melt at room temperature. The time required to melt varied from 40 to 55 minutes. The check sample melted first, then the pectin solution, the gelatine solu-

tion and finally that with lecithin.

In further tests a basic water ice mix was used. This contained 24 percent cane sugar, 10 percent corn sirup solids and 65.5 percent water, to which various stabilizers were added as shown in the table. When making a water ice, 9 gal. of one of the basic mixes was used, with 1 gal. of fruit and fruit juice mixed, flavoring and color to suit, and enough 50 percent lactic acid solution to blend the tartness in the finished product. Lemon, orange, raspberry and pineapple ices were made in each series. Pure fruit juices derived from the citrus fruits were used. The cold pack raspberries were a combination of berries and fruit juice.

For sherbet, the only change was the substitution of 1 gal. of ice cream mix for 1 gal. of the basic water ice mix, so that the raspberry sherbet, for example, contained 8 gal. of basic water ice mix, 1 gal. of 12 percent ice cream mix, 1 gal. cold pack raspberries and 8 oz. of 50 percent lactic acid solution, with color and flavoring to suit. The finished sherbet weighed about 7½ lb. per gallon, showing an overrun of about 25 percent.

Samples of the finished frozen products were placed in Sealright paper containers and kept in the hardening room for observation. There was no evidence of surface crustation or siruping. The texture of samples in the first series, containing lecithin and algin, was somewhat crumbly as compared with the check. The best dipping qualities were found in samples of the fourth series containing lecithin and oat flour.

Summary

The results of the tests may be summarized as follows: Purified lecithin used as part of the stabilizing material showed improvement in texture, dipping qualities and general handling of the finished frozen products. The flavor of the orange and lemon ices and sherbets was accentuated as compared with the check formula containing no lecithin. Also, the purified lecithin is a good wetting agent and cuts down viscosity, thus facilitating handling of the basic mix in the freezer.

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3. Randall Whitaker, The Influence of the Use of Butter on the Freezing Properties of Ice Cream Mix, *Journal of Dairy Science*, vol. 13, No. 1, 1-7, 1930.
4. O. M. Urbain and J. M. Miller, Relative Merits of Sucrose, Dextrose and Levulose as Used in the Preservation of Eggs by Freezing, *Industrial and Engineering Chemistry*, vol. 22, 355-6, 1930.
5. C. C. Walts and C. D. Dahle, The Effects of Egg Products on the Whipping Properties of Ice Cream Mixes Made from Butter and Dried Skim Milk, *Journal of Agricultural Research*, vol. 47, 967-77, 1933.
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Brief Summaries Of Grade Standards

For the convenience of those who control quality in the food industries, the following digests have been prepared of standards issued by the Agricultural Marketing Administration.

ABSTRACTS containing the principal requirements of the standards issued by the Agricultural Marketing Administration of the Department of Agriculture are prepared by FOOD INDUSTRIES. Those that follow and those which appeared in the August, September, October and November, 1941, and July, August, September, October and November, 1942, issues are a continuation of the series begun in 1940.

The complete text of the standards can be obtained from the Agricultural Marketing Administration, located in Washington, D. C.

Frozen Strawberries

(Tentative)

FROZEN STRAWBERRIES are prepared from the properly ripened fresh fruit of the strawberry plant; are stemmed, washed, and sorted; are packed with or without sugar or sirup and are frozen and stored at temperatures necessary for the preservation of the product. Whole strawberries are packed whole. Sliced strawberries are cut into slices not thicker than ¾ in.

U. S. GRADE A or U. S. FANCY frozen strawberries are strawberries of similar varietal characteristics; are practically free from defects; have a firm, fleshy texture, possess a normal flavor and odor, and are of such quality with respect to uniformity of color as to score not less than 85 points. Not more than 5 percent by count of whole strawberries may be less than ⅜ in. in diameter.

U. S. GRADE B or U. S. CHOICE frozen strawberries are strawberries of similar varietal characteristics which possess a reasonably uniform red color, are reasonably free from defects, have a reasonably firm and fleshy texture, possess a normal flavor and odor, and score not less than 70 points.

OFF-GRADE frozen strawberries are strawberries that fail to meet the requirements of U. S. GRADE B or U. S. CHOICE.

Frozen strawberries are usually packed with added sugar in a definite ratio, and such packs are designated by the pounds of fruit packed for each pound of sugar; for example, "3+1 pack" means that at the time of packing, 1 lb. of sugar is added to 3 lb. of strawberries.

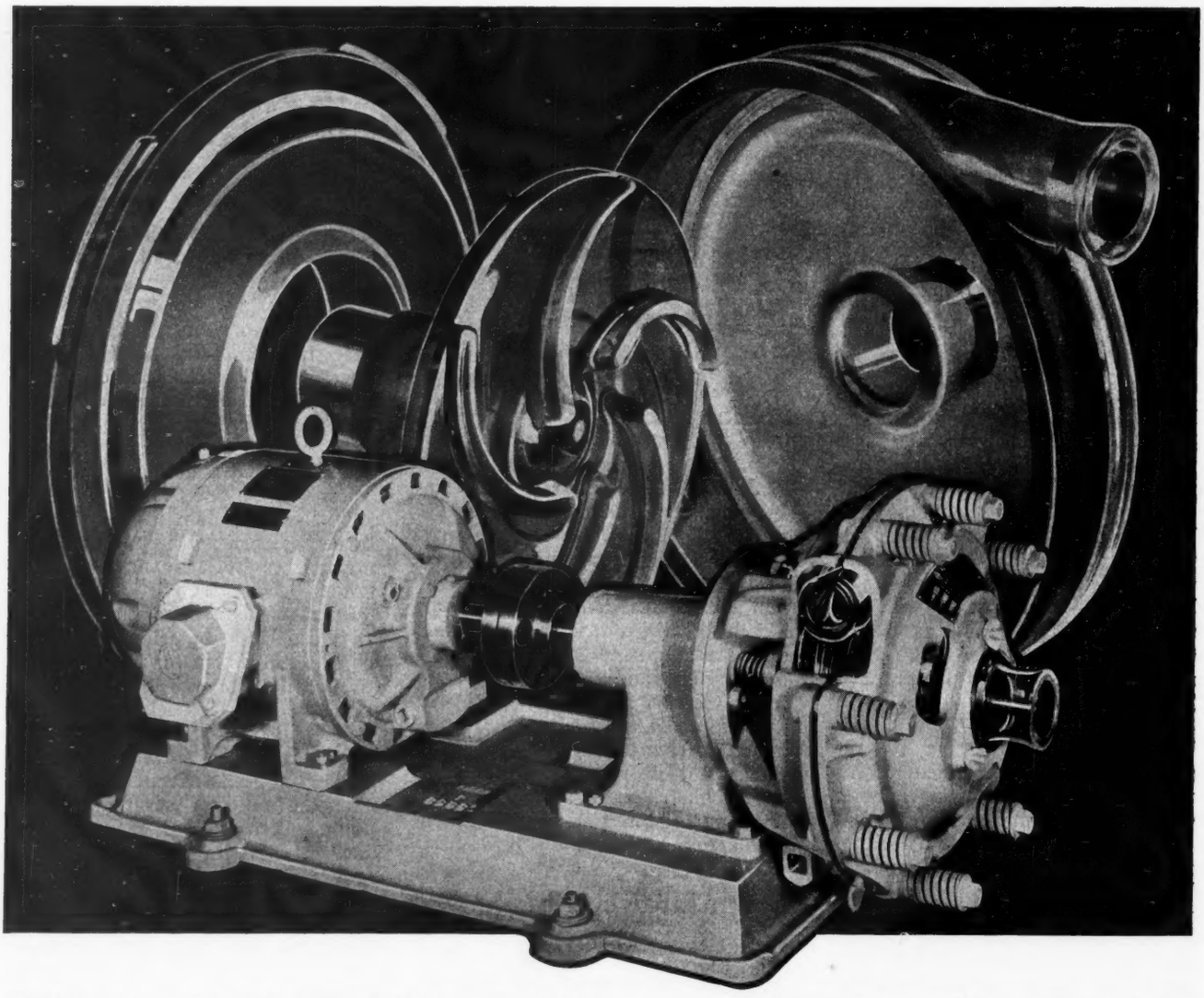
Federal inspection certificates will indicate the ratio of sugar when the amount of sugar used can be determined at the time of packing. If strawberries are packed with sirup as a packing medium, the density of the sirup at the time of packing will be indicated on the inspection certificate when it can be determined. The grade of frozen strawberries is determined immediately after complete thawing to 65 deg. F. in the package in air at room temperature (approximately 68 deg. F.) or at time of packing before freezing.

"Normal flavor and odor" means that the product is free from objectionable or off flavors or odors of any kind. The grade of frozen strawberries may be ascertained by considering, in addition to the foregoing requirements, the following quality factors: Color, absence of defects, and character of fruit.

(Turn to page 95)

The Nash *Pump of Glass*

is *transparent*, permitting constant check of color, sedimentation, etc.



Casing and moving element of this remarkable centrifugal pump are of "PYREX" brand heat and shock resisting glass. Perfect transparency permits constant observation of the interior of this pump and the material being handled. • The balanced glass impeller, rotating at 1760 R. P. M., delivers 6000 gallons of acid or other liquid per hour against a 65 foot head. • Hot acids, or brine cooled liquids may be pumped with equal facility. If cleaning is necessary, pump can be taken apart in a few moments. Reassembly is as quick, and adjustment is almost automatic. • There are many more exciting facts about this successful non-metallic pump. Write for your copy of Bulletin D-313 now.

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NEW PACKAGES & PRODUCTS

Jerrell's "Economy Brand"

DRIED skim milk, soya flour and peanut flour in 1-lb. packages are now marketed by S. T. Jerrell Co., Birmingham, Ala. While not unfamiliar products, the "Economy Brand" series has a distinctive new sales appeal when displayed on the grocer's shelves.

Jerrell's dried skim milk can be used for drinking, cooking, baking, making buttermilk and as flavoring in numerous foods. The soya flour substitutes for a percentage of wheat flour in baked goods, and the peanut flour is recommended to replace wheat flour in quick breads and simple cakes, and for use as a binder and thickening agent.

New Cocktail Crackers

Two worthy additions to the cocktail-cracker departments of the corner grocery story are "Partisnax," manufactured by Deer Park Baking Co., Chicago, and "Connoisseur Slices," product of Fleischmann's, Woodside, N. Y.

Partisnax, made of whole wheat, bran, yeast, soda, white flour binder, vegetable oil spray and salts, are packed in a cellophane inner wrap in an 8-oz. cylindrical container with a tinplate cap. They have an unusual sharp tasty flavor and are particularly adapted to use as an appetizer biscuit.

Connoisseur Slices are just what the name implies, a quality biscuit containing butter, fresh eggs, sugar, flour, soda, flavor and shortening. Thirty-four wedge-shaped slices are packed in a square tin box—although a substitute container will soon be on the market.

Puddings in Paper Cans

ATMORE & SON, INC., Philadelphia, is now using cardboard containers for its plum puddings, formerly packed in tin. The old style tapered can has been replaced with a package of the same shape, with a similar label. The sliced pudding is the same as that packed in tin except that the 10 slices in the large package and the 6 slices in the small one are wrapped in cellophane to make individual servings, then placed in the paper can and labeled. The six-slice package for home use is a recent addition to the Atmore line.

Borden Dehydrates Soups

BORDEN CO. has entered the dehydrated soup field with four flavors of soup "base": cream of onion, vichysoisse, cream of tomato and cream of green pea. The soups, which will be supplemented by other flavors in the future, are packed strictly for government use and will not be available for civilian consumption for the duration.

The formulas for the soups, developed in the Borden laboratories, contain not less than 2,700 units of vitamin D. Six ounces of dried soup base are placed in a specially constructed "thermophane" heat-sealed bag that is moisture-vapor proof and airtight, and the bag is enclosed in a paperboard carton.

Butter From Prunes

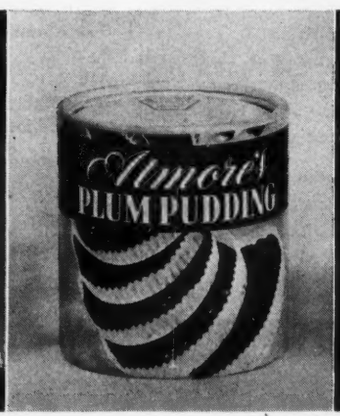
NATURAL California prune butter, which retains all of the prune except the fiber and the pit, has been selected and packaged by Parrish Foods, Inc., New York. Recommended as a natural laxative, the prune butter can be used as a prune whip or as topping for puddings, ice cream or cake, as a spread, and in cooking and baking.

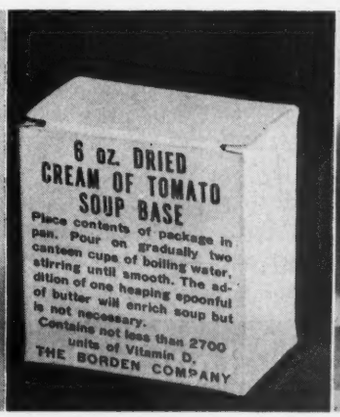
"Nimativ" ("vitamin" in reverse) brand prune butter contains no added chemicals, sugar or preservatives. The glass jar with screw closure contains 5 oz. of the product.

Tea Package Streamlined

REDESIGNED red and yellow packages of Lipton tea, both the ¼-lb. size and the tea-ball package, have been issued by Thomas J. Lipton, Inc., Hoboken, N. J. A leading package designer created the package, which uses the traditional Lipton color combination, with tones heightened, new typography, and a new portrait of the company's founder.

The new package is said to have greater "visibility" and eye-appeal.




6 OZ. DRIED
CREAM OF TOMATO
SOUP BASE
Place contents of package in pan. Pour on gradually two canteen cups of boiling water, stirring until smooth. The addition of one heaping spoonful of butter will enrich soup but is not necessary.
Contains not less than 2700 units of Vitamin D.
THE BORDEN COMPANY

WE'RE LOOKING FOR VITAMINS ON YOUR LABEL!

32 MILLION STRONG, we're looking for them!

THAT'S WHY IT'S TO YOUR ADVANTAGE, MR. FOOD MANUFACTURER, TO BE ABLE TO HAVE THAT MAGIC WORD "ENRICHED" ON YOUR LABEL. ***When we see it, WE BUY!***

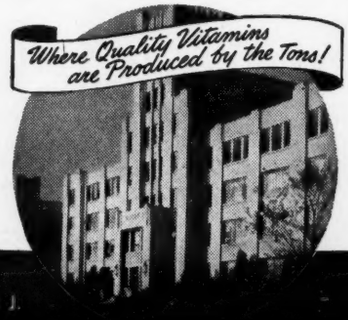
Today, the 32 million housewives of America want vitamin enriched foods. They are buying them hand-over-fist in preference to non-fortified foods. This is bringing about a revolution in the food business—*and a wonderful opportunity for you!*

For by enriching today, you serve your country and you also gain. You help make America strong by increasing the nutritional value of your products. And at the same time, you get working for you the greatest selling force the food industry has ever known!

See how sales of enriched products—white bread, family flour, cereals, etc.—have skyrocketed! What it has done for them, it can do for you. And with the cost of enriching down to a mere fraction of what it was, the time to get this great selling force working for you is *now!*

Find out today which of your products can be enriched with the greatest sales advantage. We will gladly advise you and give full technical information—how to enrich, the new low costs and the many benefits to you. We pioneered in vitamins and today manufacture a high percentage of the nation's vitamin B_1, B_2, C and niacin requirements.

Come on! Get on the band wagon of this new sales parade—write for the sales-enriching vitamin facts today!



Hoffmann-La Roche, Inc. VITAMIN DIVISION ROCHE PARK · NUTLEY · N. J.

FOOD INDUSTRY NEWS

GENERAL NEWS • TRENDS • MEN • JOBS • COMPANIES • DECEMBER, 1942

Big Boost in Dehydration Forced by War in Africa

At least four times present capacity to be needed. Pressure to produce may be put on food processors.

RECENT EVENTS in Africa already have repercussions in the food industry in this country. The responsibility of the Army to feed the people in the territories taken over will result in a sharp increase in the country's facilities for the production of dehydrated food. The 100,000,000-lb. capacity that is now enjoyed is entirely inadequate for the vast quantities of dehydrated food that must be shipped overseas within the near future.

The expansion program, in the formative stage within a week of the time our troops landed in Africa, calls for an increase in the annual capacity of as much as four times the present capacity and may emerge as an even larger program. It looks as if it might be necessary for pressure to be put on some of the larger processors not now producing dehydrated food to take on some of the additional dehydrating capacity that is wanted. And it is certain that smaller plants with records for quality production of dehydrated foods will be asked to expand their operations.

New Pricing Formula Helps Food Processors

TO PROVIDE for the increased production cost of several seasonal and miscellaneous food commodities, the OPA, on November 10, put into effect a new pricing formula. This formula is expected to ease a squeeze which had been sufficiently severe to hamper production.

The new maximum price regulation, No. 262 (Seasonal and Miscellaneous Food Commodities) effective November 14, 1942, permits increased production cost to be passed along on the wholesale and retail levels. The regulation will become mandatory on all sales and deliveries beginning December 14.

The new regulation covers these seasonal commodities: Christmas minced meats, plum, date and fig pudding, bottled eggnog, and tom and jerry batter. The miscellaneous commodities covered include bakers' fruit pie and pastry fillings, fig bars, blended maple sirup, maple sugar, egg noodles, fountain fruits, peanut candy, potato chips, raisin-filled or topped biscuits and crackers, canned boned chicken and turkey, chocolate coated sugar cones, tortillas and tamales.

Answers to Packaging Problems Discussed

WAYS of meeting the problems now developing in the use of substitute materials were discussed by the Packaging Institute at the annual meeting held in New York on November 5 and 6. Joel Y. Lund, president of the institute, urged careful consideration of just what protection a package must give, so as to avoid over-packaging and consequent unnecessary complications in packaging operations. The session on closures was particularly well attended. This meeting demonstrated the progress being made toward cooperation within the industry so that materials can be made to give maximum service.

The forum on food packaging was warned that there will not be enough paper available unless a very intelligent use is made of the various special types required.

Mr. Lund was reelected president. A. Vernon Shannon and Wallace D. Kimball were reelected vice-presidents.

Conservation Planned In Candy Industry

REPRESENTATIVES of the confectionery industry met with WPB officials in Washington early last month to develop a wartime simplification and conservation program for their industry. As a result of the conference the chief of the confectionery section of WPB, John M. Whitaker, drew up a conservation program which, in late November, was expected to become effective by December 1. The industry awaited official announcement of the program by the WPB.

More Standards Issued For Dehydrated Foods

QUARTERMASTER CORPS tentative specifications for several more dehydrated foods were issued in early November. Specifications for dehydrated apricot powder, prune powder, fruit spread and baked beans are now available, and a change has been made in export requirements for dried tomato juice cocktail.

WARTIME FOOD LINE

As scarcity of shipping caused shortages of coffee, long lines outside of coffee stores became a familiar sight in October and November. And in the Nation's Capital, coffee lines were picketed by representatives of Washington's League of Women Shoppers, who carried signs such as "Hoarding helps little," and "Line up for liberty not for coffee." Rationing is expected to provide uniform distribution and eliminate the coffee line.

Essential Plants To Make Inventory of Workers

Will assure orderly shift of men to armed forces. All physically qualified eventually to be drafted.

EARLY in November local draft boards were told that more men in "essential activities" would have to be taken into the armed services. And the War Manpower Commission and the Selective Service System have provided a means of handling the situation as painlessly as possible—as an "orderly withdrawal." The device is an inventory of personnel in each plant, called a "Manning Table."

As stated in the official information booklet describing the plan: "Both trained fighters and trained workers are essential to the winning of the war. Trained fighters, however, are more restricted as to age, sex and physical condition than are workers. *The needs of the armed forces will compel the eventual induction into active service of practically all men who can meet the age, physical and other requirements. These men must be released by industry.* The Manning Table Plan provides the basis for the withdrawal of such workers at a rate that will allow others not suitable for active service to be trained to replace them." (The italics are ours.)

The inventory of the plant's personnel is made to show the number of employees by job, race, sex, age, physical handicaps and minimum training time for replacements. The additional future labor needs are surveyed to show how the needs can be satisfied. The inventory includes the number that can be supplied by the transfer or upgrading of men in the plant and a survey in detail of the requirements by months, experience and training of men recruited from outside the plant. Included with the survey is a breakdown of the workers by age groups of three-year intervals and whether the worker is single, married, and married with dependents.

To be applicable to any Selective Service activity, the Manning Table must be accepted by the State Director of Selective Service in the state where the plant is located. On such acceptance the State Director assigns a State Acceptance Number to the employer, who is then authorized to use the number on the Affidavit—Occupational Classification (Form 42A) which is filed with the local draft board for all employees of draft age whose occupational deferment is considered necessary.

The introduction of the Manning Table Plan does not mean that occupational deferment policies are changed, since it has been definitely stated by SSS that the question of deferment remains in the hands of the local draft boards. The local draft boards use the Manning Table Plan as an indication of the replacement time of a workman which "has been determined under an accepted replacement schedule." Requests for deferment from plants not using the Manning Table will continue to receive the same consideration they have in the past.

The realistic attitude for employers to take is that in the final analysis they better have a Manning Table and get it certified. With the manpower crisis confronting the country, a request for the occupational deferment that does not carry a State Acceptance Number eventually will get little consideration.

Bad News About Ice Cream

SHORTAGES of equipment, supplies and transportation, along with the necessity of supplying military needs, will whittle the production of ice cream and cut the number of varieties, it was asserted at the convention of Michigan Dairy Manufacturers Association, November 5-7. The manufacturers were informed that the rationing of fats would limit the use of chocolate coatings and ice cream and lower production of chocolate ice cream. But it was suggested that butterscotch, caramel and orange flavoring, as well as diluted chocolate, should meet the problem.

It was reported that soldiers at Army camps are eating four times as much ice cream per capita as civilians and that dry ice cream is being shipped in large quantities to the fronts in Australia and Egypt.

OPA Amends Freezing Order for Dried Fruit

TWO CHANGES have been made by amendment to Order M-205 restricting the sale to civilians of dried fruits. These products no longer may be released automatically to civilians upon the mere lapse of time, but the amendment has made it possible for packers to sell dried fruits to the Army and to AMA without specific allocation by the WPB. Under the original order, packers were required to set aside for government purchase their entire existing inventory of dried apples, apricots, peaches, pears, prunes, and grapes (raisins). If the fruit was not purchased by the government agencies designated by WPB within 60 days after the packers filed their reports, the packers were permitted to sell it for civilian use, unless notified to continue to hold it.

DEVELOPS NEW BISCUIT FOR K RATION

Loose-Wiles Biscuit Co., Long Island City, N. Y., had for seven years been perfecting a graham cracker for civilian use which was fortified with additional minerals and vitamins. With minor changes, this biscuit is now the official cracker component of the K field ration. It was also an achievement to package these crackers in units of four in sealed cellophane with close dimensional tolerances. The package is being examined here by (left to right) Major R. H. MacDonnell, assistant to Col. R. A. Isker; Dr. Stanley Jackson, director of the Loose-Wiles biochemical laboratories; James Larrimore, director of the Loose-Wiles government supply division; and Colonel Isker, chief of the Subsistence Research Laboratory of the Chicago Quartermaster Depot.

Big Demand for Dehydrated Pork

AMA forecasts production at annual rate of 45,000,000 lb. for Lease-Lend and Army

DEHYDRATED pork, a product never before on the commercial market, will be produced at an annual rate of 45,000,000 lb. by March 1 for Lease-Lend and military use, it was forecast last month by the Agricultural Marketing Administration. The first contract for this new dehydrated product was awarded early in November to Cudahy Packing Co., Chicago, and called for 110,000 lb. And it was subsequently reported that eleven plants of seven leading meat packers are being equipped to dehydrate pork and have been issued high priorities on the necessary materials by the WPB.

AMA has indicated that Swift & Co. will operate four meat dehydrating plants, and that a contract for the first 200,000 lb. of pork is being negotiated. Other packing firms expected to produce this commodity for the government are Kingan & Co., Roberts & Oak, Rath Packing Co., Geo. A. Hormel & Co., and Rahl Packing Co.

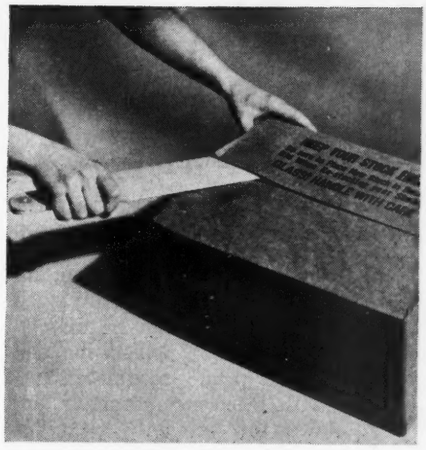
Russia has indicated that it will buy all the dehydrated pork produced in this country, and England is said to desire 7,000 to 8,000 tons.

A short time ago Swift was given a contract for 100,000 lb. of dehydrated beef, but AMA has indicated that most of the dehydrated meat bought in the future will be pork. This is due to the scarcity of beef.

Various pork dehydrating processes are under study, but the method used by Cudahy to fulfill its contract involves cutting boneless pork into cubes, thoroughly cooking it and then dehydrating it in vacuum dehydraters. The pork is then packed in tins and sealed under vacuum.

New Method Developed For Canning Cheese

WHEN tin cans again become available, it will be possible to produce canned cheese by a method developed at the New York State Agricultural Experiment Station. Natural Cheddar, Limburger, Brie, Tilsiter and Camembert cheeses have been successfully canned. The cheeses are permitted to go through a preliminary curing before packaging and they are packed under vacuum and in the presence of a small amount of magnesium or calcium hydroxide. The chemicals are used to take care of the gas evolved in the normal ripening process.



IT SAVES CARTONS

To make it easier to open cartons without damaging the flaps, permitting reuse, Kraft Cheese Co., Chicago, has supplied distributors with a thin wooden paddle. This paddle is slipped under the flaps to break the carton open without tearing.

AMA Changes Buying Set-up

Purchase programs placed in hands of commodity branches to concentrate responsibility

THE reassignment of purchase functions that took place within the Agricultural Marketing Administration early in November will have little or no effect upon the members of the food industry doing business with that organization. The changes were made to concentrate the responsibilities for specific functions and thereby facilitate Lease-Lend purchasing.

The Purchase Branch of AMA was abolished, as such, and the responsibility for the initiation, formulation and execution of all purchase programs was placed in the hands of the commodity branches: Fruit and vegetables, livestock, dairy and poultry, cotton, tobacco, and grain feed and seed. These branches now issue purchase announcements, receive offers to sell, sign contracts, make inspection and any other duties connected with the purchases. An important feature from an internal standpoint is the concentration of trained men so that their technical knowledge will be more readily available when purchases are made. It has the effect of increasing the manpower of AMA.

H. C. Albin, formerly chief of the purchase branch, was appointed the Chief of the new Special Commodities Branch which now handles items that do not fall under other branches, including fish and fish products, vitamins, coffee, tea, sugar, vinegar, spices and condiments.

Food Processors Meet on Dec. 14

To get from representatives of government agencies facts which will aid planning

CLOSER alignment of the food processing industries with the war program and a better understanding of government plans and of war agency regulations are expected to come out of the Food Processors' Conference to be held at the Palmer House, Chicago, December 14 to 16. And processors hope to come away from the conference with information that will enable them to make definite plans for 1943.

More than 40 representatives of government agencies will participate in the conference as speakers, members of panels and consultants. Crop goals, containers and priorities, government purchases and buying procedures, shipping case and can marking requirements, price policies and controls, labor supplies and transportation are among the subjects that will be discussed at the conference.

The conference will be attended by canners, dehydrators, freezers and preservers.

These processors will have the much needed wartime opportunity of listening to and consulting with men from the Quartermaster Corps, WPB, OPA and AMA. As an example of what is forthcoming at the sessions of the conference, the tentative program lists these speakers on the opening general session: Brig. Gen. Carl A. Hardigg, Office of the Quartermaster General; Roy F. Hendrickson, Administrator of the Agricultural Marketing Administration; A. C. Hoffman, Director, Food Price Division, Office of Price Administration; and Douglas C. Townson, Director, Food Division, War Production Board.

AMA Offers To Sell Roller Dried Milk

AS A MOVE to aid the milk drying industry in supplying additional roller powder to take the place of spray powder for domestic use during the period of seasonal low production, AMA announced on November 13 that it will sell up to 15,000,000 lb. of its present stocks of roller processed dry skim milk to manufacturers and handlers supplying spray processed dry skim milk to government agencies. This action was necessary because manufacturers have been ordered to set aside at least 90 percent of the total production of sprayed skim powder for government use.

WPB Sets Up New Plan To Control Materials

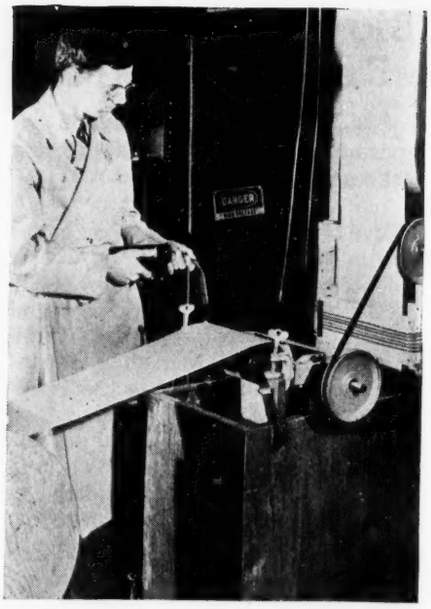
Will align production schedules with supply of materials. Applies to steel, copper, aluminum

MATERIALS are to be distributed to industry by a new method—the Controlled Materials Plan. The principal architect and future pilot of CMP is Ferdinand Eberstadt, who recently left his position as chairman of the Army-Navy Munitions Board to become program vice-chairman of the War Production Board.

The plan provides a bill-of-material vertical-type of control over critical materials as against the PRP horizontal type of control. The main purpose is to adjust production schedules to the amount of material available and to provide for a steady flow of materials where needed and as needed.

As the plan gets under way the allocation of three critical materials—iron and steel, copper and aluminum—will be undertaken. These metals will be doled out to seven claimant agencies—Army, Navy, Lend-Lease, Maritime Commission, the Aircraft Scheduling Unit, Board of Economic Warfare and Civilian Supply. The claimant agencies in turn will split up the material allotted to them to their prime contractors. The prime contractors will divy up with their subcontractors, and so on down the line until every one supplying anything for the prime contractor has been taken care of.

The plan will not be in 100 per cent operation until the third quarter of 1943, and until that time all materials that are not under the plan will be secured by industry under PRP in the usual way. The food industries will be under Civilian Supply, which will act as the prime contractor in the allocation of critical materials (steel, copper and aluminum) starting in the second quarter of 1943. Containers, machinery, and repair materials and operating supplies containing the critical materials will be the first items to come under the CMP. (*Effective April* 1, 1943.)



IMPROVEMENT IN MAKING TINPLATE

Electrolytic tinplate takes only about one-third the amount of tin previously used for hot-dipped plate, but the coating as deposited is somewhat porous and has a gray matte appearance. This necessitates heating the plate to flow the tin coating, not only to give it a bright appearance but to improve its corrosion resistance. Shown here is an induction method of heating developed by Westinghouse in which radio-frequency current (200,000 cycles) is passed through a water-cooled copper-tube coil through which the strip of electrolytic tinplate passes. The coil sets up induced current in the plate, heating the tin to melting temperature in a fraction of a second.

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Glengarrie
POPLIN
Demand these labels when buying uniforms
UNIFORMS OF REEVES ARMY TWILL CAN TAKE IT!
Uniforms that are neat in appearance and easy to keep clean are essential in the food industry. So specify Reeves famous fabrics for your uniforms.
REEVES ARMY TWILL meets exacting U. S. Government Tests for better wear, longer life, and colorfastness. Its fabric vitality keeps it "in shape" under trying conditions.
For matching shirts, specify GLENGARRIE POPLIN, a durable, stylish fabric in a wide range of colors. Both fabrics are Sanforized * against shrinking.
*Fabric shrinkage not more than 1% (U. S. Government Test CCC-T-191-a)
See your nearest dealer for uniforms, sport and work clothes made from these famous fabrics, or write for colorful leaflet to:
OVER 60 50 million yards of Reeves Army Twill sold to the U.S. Army
REEVES BROTHERS, INC.
54 WORTH STREET
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Canners Granted Higher Priority

Applies to maintenance and rates industry second only to makers of tanks, planes, guns

THE REPAIR and maintenance of plants engaged in canning fruits and vegetables was given an importance second only to the manufacture of airplanes, tanks and guns by the recent amendment to Preference Order P-115, which assigned a top rating of AA-2X for use in certain emergencies.

While this order will be of great assistance, its other implications to the canners affected should not be overlooked. The original order assigned an A-1-c rating for plant addition and expansion. This provision did not appear in the amended order since no new plants or additions to old plants are contemplated. A rating high enough to secure repair and maintenance material in competition with the best may be construed as an order from WPB to keep the present equipment in a high

state of repair, since it must last for the duration. Also for the first time, producers of canned or frozen fish are brought under the benefits of the order.

The ratings assigned by order P-115 before and after the amendment of October 27 are as follows:

New Rating		Old rating
AA-2X	Material required for emergency repair to avert spoilage because of breakdown.....	A-1-a
AA-5	Material for repair maintenance and operation	A-1-j
AA-3	Material for replacement or for more efficient operation ...	A-1-c

The AA-3 rating applies only to canning and processing equipment, and may be applied only upon authority given by the Director General of Operations made in response to an application on Form Pd-285 just as specified in the old order.

Orders can be placed now for equipment and repairs for the calendar year 1943 under the terms of the amended order

Glass Containers Can Save More Steel, Tin

IF CERTAIN basic difficulties can be solved permitting the maximum utilization of glass containers for foods, it is possible to save half a million tons of steel and about 5,000 tons of tin, it was stated by Edward J. Detgen, chief of the specialty staff of the U. S. Department of Commerce, at the annual meeting of Glass Container Association of America, in New York, October 29. The serious effect on our economies of a steadily diminishing quantity of containers cannot be overlooked, in the opinion of Mr. Detgen, but further restrictions on the use of critical materials will not wait on the development of substitutes. In the final analysis, the impact will be great or small depending on the ingenuity and resourcefulness of the people in the packaging industry.

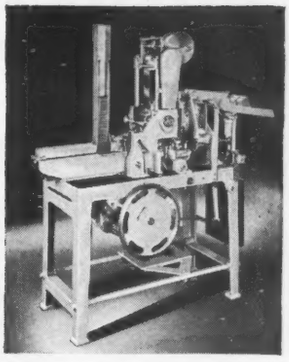
SCHEDULE OF EVENTS

DECEMBER

Nov. 30–4—National Exposition of Power and Mechanical Engineering, Madison Square Garden, New York, N. Y.
1–2—American Society of Refrigerating Engineers, 38th annual meeting, Hotel Commodore, New York, N. Y.
2—National Dairy Council, annual meeting, Palmer House, Chicago, Ill.
14–16—Food Processors Conference, sponsored by National Canners Association, Palmer House, Chicago, Ill.
15–20—National Child Health and Welfare Exposition, Madison Square Garden, New York, N. Y.
28–30—Society of American Bacteriologists, annual meeting, Deshler-Wallick Hotel, Columbus, Ohio.

JANUARY

9–11—Eastern Soda Water Bottlers Association, Statler Hotel, Boston, Mass.
24–26—Potomac States Bakers Association, Lord Baltimore Hotel, Baltimore, Md.



It used to wrap his cigarettes

★

NOW it wraps his RATIONS

Some time ago a well-known cigarette manufacturer replaced some of our cellophane wrapping machines with our more modern, higher speed models . . . Today the old machines are back in service again, turning out wrapped packages of army rations for a prominent food company . . . We couldn't deliver new machines to the food manufacturer, so we put him in touch with the cigarette maker.

Numerous other concerns have sold or leased their machines to those who sorely needed them through leads furnished by our Wrapping Machine Procurement Service . . . Candy bar makers have obtained wrapping machines from candle and cheese manufacturers; food manufacturers have bought or leased machines from makers of cigarettes, paper specialties, cosmetics, etc.; soap wrapping machines are now wrapping ration bars for a well-known chocolate manufacturer.

LIST IDLE MACHINES WITH US

If you have a wrapping machine or machines of our make which you do not need at present, why not list them with us, so that we may direct to you those who could use the equipment?

We make no charge for this service . . . We are doing it purely to assist those for whom we cannot build new machines, because of war work.

Get in touch with our nearest office

PACKAGE MACHINERY COMPANY
Springfield, Massachusetts
New York • Chicago • Cleveland • Los Angeles • Toronto

★

METAL for the War

One-half the steel output is composed of scrap iron and steel

THROW YOUR SCRAP INTO THE FIGHT!

★

PACKAGE MACHINERY COMPANY
Over a Quarter Billion Packages per day are wrapped on our Machines

WORLD'S

NUMBER ONE LABELING JOB

THE BUILDERS of WORLD Labelers are on the job twenty-four hours a day, producing equipment to help plaster defeat on our enemies and make it stick.

Until that job is finished we shall be unable to provide the range of services to WORLD Labeler users in which we have taken so much pride for so many years.

WORLD Labeler service facilities will be maintained to the best of our ability in order that your Labelers may continue to do their best work for you however long and hard they may be used.

For information and assistance on Labeler operation and adaptation to the needs of the day, do not fail to get in touch with WORLD labeling headquarters. Our booklet "Liberty and Labeling" contains practical information on Labeler care and maintenance. May we mail you a copy?

WORLD LABELERS

ECONOMIC MACHINERY CO.

WORCESTER, MASSACHUSETTS

WPB Organizes Research Unit

Will speed utilization of new research developments. Headed by Dr. Harvey N. Davis

THE NEED for coordinated research within WPB has been recognized in the foundation of the Office of Production Research and Development and the naming of Dr. Harvey N. Davis as director. The new OPR will speed up appraisal of new processes, organize and arrange for the financing of research, and insure prompt industrialization of research results in the interest of the war effort.

Director Davis will serve as a technical adviser to Donald Nelson on all engineering and scientific matters. He will arrange means for quick appraisal of new problems where scientific and technologic judgment is required. Review by his office of all research undertakings of WPB will insure against overlapping or conflict between projects of the various branches and divisions. However, it will not relieve each subordinate chief of WPB from the responsibility for keeping projects moving once approved.

Where research on new food developments is required, food dehydration for example, the OPRD will have the means for evaluating new ideas, utilizing existing research personnel and facilities, and insuring cooperation between industry and any governmental agency that should participate. Funds will be available for allotment for approved undertakings under many circumstances.

During the latter half of November, Dr. Davis was engaged on the organization of a staff and the building of a coordinated plan for procedure within WPB.

Very definitely he anticipates the using of all present facilities, not the building of something new to take the place of the units now successfully functioning. The OPRD will not set up a research laboratory of its own. It will contract with outside laboratories or agencies for experimental work.

Renegotiation Law Affects Processors

GOVERNMENT contracts for the purchase of food are subject to the provisions of the contract renegotiation law. But for practical purposes such contractors may consider themselves immune. It is doubtful if any contract for less than a million dollars will be reopened except in cases of flagrant profiteering. Even so every food processor selling to the government should be familiar with the act.

Contractors whose annual business exceeds $100,000 are subject to renegotiation regardless of how small the individual contracts may be. Operation under price ceilings does not provide exemption. Neither does the fact that the goods have been sold on a bid and acceptance basis.

The Act provides the authority to make the sale of perishable foods immune to renegotiation but does not provide that it shall be exercised. In its present form the renegotiation law is a common-sense document that states clearly what can and cannot be done. It should calm the fears of business men concerning possible trouble in the future.

"They're showing Frank Buck through the plant this afternoon"

War Production Board Orders

Fats and Oils—An amendment to Order M-71, issued October 27, revises control of the nation's supply of fats and oils to facilitate deliveries to the armed forces and Lease-Lend. To make it possible for military subcontractors for edible products to avail themselves of the military exemption to restrictions on fats and oils, the amendment authorizes the procurement officer of the Army, Navy or Lease-Lend to issue certificates to extend exemption.

Marking Cans—Because military operations often involve handling supplies under difficult conditions, WPB has asked food canners to mark on cans the contents of each can. This will save confusion when cans containing food become wet and lose their labels. Until a permanent method of marking the cans has been established, WPB suggests that they be labeled by embossing the name of the product on the cover of the can at the closing machine; by printing the name of the product on the body or end of the cans with noncorrosive ink; by lithographing the name on the body or ends; or by printing and stenciling by hand.

Canned Sauerkraut—Government requirements have created a shortage in canned sauerkraut. Order M-245, issued October 23, requires all canners, wholesalers, jobbers and brokers of canned sauerkraut to set aside all of the product in their possession, under their control, or in transit to them on October 23, 1942, and any canned sauerkraut acquired by them between October 23 and March 31, 1943, without regard to previously existing contracts. These stocks may be sold only to the Army, Navy, Marine Corps, Coast Guard, War Shipping Administration or agency of the Federal government.

Priorities Regulation 10—On November 5, WPB revoked the much-discussed Priorities Regulation 10 establishing the Allocation Classification System. The Allocation Classification plan is the one discussed in Food Industries, August 1942, page 39.

Oysters—To conserve additional supplies of tin and steel for war production, WPB on November 4 requested oyster packers to increase by 40 or 50 percent the amount of oysters packed in various sizes of containers. Packers are requested to pack 7½ oz. in a No. 1 can instead of 5 oz.; and 14 oz. in a No. 2 can instead of 10 oz. A 50 percent increase in the fill of other permitted cans has also been requested by the Food Branch. Oyster packers in seven states are affected by the Order.

Canned Fruits, Vegetables—Restrictions on canners' deliveries have been relaxed and the financing, warehousing and shipping requirements of the original order have been eased in an amendment to Order M-237 issued October 30. Shipments of canned fruits, vegetables and fruit and vegetable juices, outside of quota limitations originally prescribed, are permitted under specified conditions. Any canner was permitted to deliver up to 70 percent in advance of December 1, if he first notified the purchaser what the delivery date would be; part of the remaining 30 percent subject to the April 1, 1943, delivery date must be held near the plant unless WPB is notified. Canners of apple juice, cranberries, pumpkin and squash may freely deliver up to 80 percent of their pack at any time up to April 1, 1943. Deliveries of tomato pulp in 5-gal. cans, tomato paste in No. 10 cans, and peppers for the purpose of remanufacture are quota exempt.

Blackplate Cans—Latest restrictions on the use of blackplate cans affect baking powder, in Amendment 2 to Order M-136. Until December 31, 1942, blackplate ends can be used only for 6-oz. or larger fiber-body cans. A canner's blackplate quota from October 1 to December 31 is the area of blackplate required for making the specified can parts sufficient to pack 25 percent of the baking powder packed by the canner in 1941.

Laboratory Supplies—Research laboratories were given assistance in securing a continuing supply of reagent chemicals, laboratory equipment and other materials in a new Preference Rating Order P-135, issued November 7. Order P-43, as revised, is expanded to cover qualified production control as well as research laboratories and assigns to all laboratories holding a serial number under P-43 a rating of AA-2X for the purchase of equipment, reagent chemicals and other materials.

Tinplate, Terneplate Cans—Conservation Order M-81 was amended for the fifth time on November 4 in regard to edible oils. Only animal, vegetable, olive, fish and other marine animal, and edible blends of such oils may be packed in 5-gal. cans. The quota for the period from November 1, 1942, to December 31, 1942, is 10 percent of the 1940 pack in 5-gal. cans.

AAAS To Discuss Food Dehydration

Food dehydration will be one of the principal topics under discussion at the engineering sessions of the American Association for the Advancement of Science, at the Hotel Commodore, New York, December 30. H. J. Masson, College of Engineering, New York University, will present the theory of dehydration processes; G. L. Montgomery, Associate Editor of Food Industries, will discuss application of theory to manufacture, and Capt. R. P. Melson, Subsistence Research Laboratories, U. S. Quartermaster Corps, will round out the session with a talk on military and civilian practice.

GET WISE

. . . on How to meet those NEW INQUIRIES . . . on the nose!

Bags are going to be more important in your life than ever before. Not just ordinary bags, but *special* bags to meet the new packaging problems resulting from curtailment of tin, steel, glass and rubber gaskets.

We mean glassine bags, single and double-waxed, parchment bags, cellophane bags, special carton liners. We mean bags to protect all sorts of food products, even to milk and eggs! And we mean bags that carry an extra sales punch through more brilliant, more accurate printing. We mean, in short, the kind of bags that Allied is making for leading food packers.

After all, there's more satisfaction, and more profit too, in handling top-grade products. Give us a call. It's time to get acquainted.

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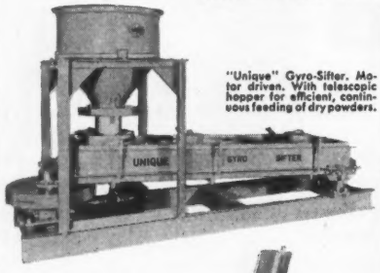
PROCESSING EQUIPMENT FOR WAR INDUSTRIES

Robinson Engineers are at your service! Avail yourself of their experience and of the facilities of our modern testing laboratory. Illustrated catalogs on request for any "Unique" equipment.

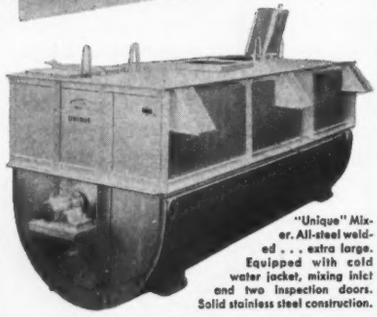
"Unique" Saw Tooth Crusher. Special grade steel saws, mounted in roller bearings. Heavy-duty balance wheel carries intermittent shock load.

"Unique" Jr. Disc Grinder. Built-in direct-drive motor. Shown equipped with jacket for hot or cold water or steam and mounted on steel base.

"Unique" Tumbling Prism Mixer. Driven by gearhead motor. For handling dry powders that cannot stand much agitation. All-steel welded frame.



"Unique" Gyro-Sifter. Motor driven. With telescopic hopper for efficient, continuous feeding of dry powders.



"Unique" Mixer. All-steel welded . . . extra large. Equipped with cold water jacket, mixing inlet and two inspection doors. Solid stainless steel construction.

Firms with war contracts have immediate priority on our complete engineering and manufacturing facilities.

ROBINSON MANUFACTURING COMPANY

WORKS: MUNCY, PA.

30 CHURCH STREET, NEW YORK

CAPITAL VIEWS

CENTRALIZED PRODUCTION—Steps are being taken to reduce the number of companies processing any particular kind of food when the total capacity of the industry exceeds the required output. Companies seeking to maintain operations should be prepared to demonstrate low cost, minimum labor requirements, and other advantages important to the public in wartime. If much power is used in manufacturing, then plants will be favored which have a minimum power requirement per unit of output or which are located where power supply is ample because few other power-using war industries are functioning. Every management likely to be affected by this centralization program should study its opportunity for service and be prepared to present its case when its industry is up for review. Centralization is likely to be directed more by the Department of Agriculture than by WPB. But the general policies of the new Food Administrator, if and when appointed, will govern.

ADVISORY COMMITTEES—Plans for more advisory committees on various parts of the food program are being perfected. As yet, Washington is not carrying out the fundamental policy of an overall food industry advisory group. Such agency is likely to come from a Food Administrator in time, perhaps more promptly than expected in late November. But naming an overall committee will not eliminate the use of special advisory groups.

STANDARDIZING DOWNWARD – In order to secure more standardization, there is a strong tendency in Washington to destroy premium quality foods. This applies to unprocessed as well as processed types. Apparently, there are two motives. First is the desire to get maximum production, which government officials seem to think is incompatible with best quality. Second is the desire to maintain price ceilings at the lowest practical level. Obviously, standardized mediocrity is easier to police at low prices than first-quality goods. Food company executives interested in their post-war reputation will have to figure out some way in which to meet such low ceiling prices without complete loss of profit. The alternative is to throw quality to the winds and hope to rebuild customer acceptance after the war. Official Washington seems indifferent on this phase of the problem. But wise executives dare not be.

CHEMICAL SHORTAGE—Raw materials supply for food processing may be curtailed by many factors affecting 1943 crops. Not the least important is the possible shortage of fertilizer chemicals, insecticides and fungicides, and other agricultural chemicals. Food executives responsible for planning of crop programs must immediately explore these situations in order to insure that their growers have made proper arrangements for next year's agricultural chemical supply. Most serious in the field of fertilizers is the prospective shortage of nitrogen, caused by the need of all ammonia available for high explosives manufacture. There will probably be an abundance of oil-seed meals which are high in nitrogen, especially peanut meal and soybean meal. Some arrangement must be made to get these higher cost nitrogen sources into use, despite the fact that farmers needing them do not like to pay more than normal for the inorganic fertilizers. But if the inorganic type is not available, it is much better, and still quite profitable, to use a generous supply of organic nitrogen even when the apparent unit cost is a bit above normal.

RENEGOTIATE PROMPTLY—Few food companies have "negotiated" supply contracts with the government. But those who do should get promptly in touch with officers charged with renegotiation. The law now provides for a final settlement on renegotiation, which will give assurance of stability during the rest of the contract period. Delay only invites disappointment.

WHO GETS WHAT?—Chain stores with low ceiling prices are getting less of certain scarce materials than independent merchants with higher ceilings for the same goods. This is making necessary uniform price ceilings fixed on a cents per unit basis. Washington is beginning to catch up on such cases. It will welcome cooperation of producing groups who can explain how an equitable overall ceiling can be fixed to take the place of individual-store maximum prices that cause unfairness and disturbance of normal trade relations. Producers can well initiate such cases with OPA, when they have all the facts in defensible form. They may thus preclude amateur bungling when inexperienced officials start in to fix such defects. Incidentally, these cases may occasionally lead to legitimate subsidies where the mark-up between the actual cost of production and the maximum desired ceiling is insufficient to permit continuance of reasonable distribution practice.

SALARY CEILINGS – Full regulations have been drafted on wage and salary ceilings. And the government means business in saying that increases in pay may no longer be granted without official approval except under very special circumstances. Merit can still be recognized if one follows the rules carefully. But general wage upping is a thing of the past.

WAGE CONTRACTS – The Supreme Court has made certain types of wage contracts with employees much more attractive than heretofore. In rulings of mid-October, the Court decided that pay and a half for overtime was not required under certain circumstances, when wage contracts with employees provided for something less than this. This is not a blanket permit to ignore overtime rates. But it does make wage contracts of certain classes mutually an advantage to employers and workers. Obviously, the exemption applies only when the base rate is far above the legal minimum.

Coffee Ration Goes into Effect

Expected to cut consumption by 38 percent and to spread supply evenly

COFFEE rationing, scheduled to start November 28, will reduce the amount available to each coffee drinker by about 38 percent, compared with the 1937–41 five-year average.

The amount of coffee consumed in this country was increasing steadily during the five years before we got into the war, going from 1,400,000,000 lb. in 1937 to 1,700,000,000 lb. in 1941. In this period coffee drinkers used an average of 21 lb. of coffee each per year, or 12.5 lb. per capita for the nation.

Restaurants and other institutions consume about one-fifth of all coffee sold in the country, and it is the plan of OPA to apply about the same reduction to them as to the individual under rationing.

The individual ration is one pound for five weeks, which is 10.4 lb. a year. Adding the amount of coffee consumed through restaurants and other institutions, the average American coffee drinker under rationing will consume about 13 lb. a year.

Willis Predicts Food Scandal

Dehydration and quick freezing expansion programs reported at GMA meeting

UNLESS a food administrator is appointed to coordinate wartime operations of the food industries, the country faces a food scandal far greater than the rubber situation. That was the opinion expressed by Paul S. Willis, president of Grocery Manufacturers of America at the fall meeting in New York on November 18-20.

Mr. Willis also reported that the astounding total of 6,344,000,000 lb. of foodstuffs had been delivered by the food industries for shipment to our allies in the past year. And he said that the time has come for the industry to undertake a greatly enlarged, industry-wide program to improve relations with the public. This program, he indicated, should reach farmers and food industry employees, as well as the general public.

Within two years, the food industry will advance 25 years in terms of forward movement in research facilities, Mr. Willis prophesied.

The government's dehydration program for next year will exceed a billion pounds, including milk, eggs, meat, vegetables and fruit, according to Col. Paul Logan, Office of the Quartermaster General. And plans have been made to expand quick freezing operations. This expansion will take about 2,000 tons of steel, but will save 8,000 tons a year. Colonel Logan also reported that recent work on compression indicated that some of the dehydrated foods would be compressed into bricketts to save shipping space.

Southern Ice Cream Makers Hold Meeting

THE Southern Association of Ice Cream Manufacturers held their annual Convention at the Biltmore Hotel, Atlanta, Ga., Nov. 4-5. Business and War was the general theme, mostly war. Washington was well represented on the program with speakers from OPA, WPB, ODT, Army, Navy and other agencies and departments.

Secretary Doyne announced at the final session that the Association at the two-day meeting had sold War Bonds in the amount of $68,000. Each of the 225 members and visitors contributed to this effort in the early stages, taking one $25 bond at the time of registering.

TAKE CARE OF RUBBER GLOVES

Keep rubber gloves away from, and their surface cleaned of, oils, greases and other natural enemies of rubber. Clean the gloves thoroughly after use, as is being done here, using luke warm water and a good grade of soap. And be sure to rinse off all the soap after cleaning. Then hang the gloves up to dry, and store in a cool place away from direct sunlight. In removing the gloves from the hands, peel them off, inside out, and dust inside well with talcum each time they are removed. Lastly, keep two pairs available, wearing each every other day.

Only 1 Minute

TO TEST MOISTURE

In dehydrated Eggs, Meats, Vegetables, Etc.

● Accurate moisture tests are made in only one minute with the Steinlite . . . on dehydrated vegetables, eggs, meats and most ground or powdered products. This instrument, which operates on the radio frequency impedance principles, is simple to use and reliable. The sample need not be ground, and it is not heated or damaged. The Steinlite has a moisture range of 1 to 16% and is accurate to plus or minus .2 of 1%. Has proven its worth in the grain industry where over 2,000 units are in use.

Write for a descriptive folder and information about our FREE TRIAL OFFER. Deliveries are affected by the National Emergency.

Steinlite Moisture Tester

- Electrical in principle.
- Easy to use.
- Saves money.
- Speeds production.
- Accuracy guaranteed.

SEEDBURO EQUIPMENT CO.

634 BROOKS BUILDING (Seed Trade Reporting Bureau) CHICAGO, ILL.

Nutrition Fund Exceeds Million

Contributed by manufacturers for five-year basic research program on nutrition

More than $1,000,000 has been contributed by a group of food and closely related manufacturers to support a five-year program of basic research in the science of nutrition. This was announced by George A. Sloan, president of the Nutrition Foundation, Inc., on November 12, on the occasion of a meeting of the trustees in Chicago.

Eighteen additional grants-in-aid, totaling $46,600, were made by the Board of Trustees on November 12, making a total of 54 grants allocated this year to 33 colleges, universities and medical centers.

Mr. Sloan also announced the election of Safeway Stores, Inc., Oakland, Calif., and the American Sugar Refining Co., New York, as founder members of the Foundation. He also reported the election of three sustaining members: Gerber Products Co., Fremont, Mich.; Golden State Co., Ltd., San Francisco; Chr. Hansen's Laboratory, Little Falls, N. Y.; McCormick & Co., Baltimore, Md.; Minnesota Valley Canning Co., Le Sueur, Minn., and the Drackett Company, Cincinnati.

Speaking at the Nutrition Foundation meeting Dr. Morris Fishbein, Editor, *Journal of the American Medical Association*, expressed this viewpoint of the medical profession: "Whereas we now feel that restoration of natural foods to the best that natural foods can provide is the ideal procedure, it is conceivable that alternate proposals —such as the addition of essential minerals to ordinary table salt—may ultimately prevail."

He also made this comment: "If there is any criticism that medicine has to make in the current drive for improved nutrition, it is excess exploitation of certain concepts before they have been fully established and properly integrated into our knowledge of nutrition as a whole."

Colonel R. A. Isker, QMC, told the nutritionists that "it is not sufficient to have the nutritive element present in the food when packing, but it must be there when the soldier eats it."

Peanuts May Become Major Crop of South

The value of the peanut crop, which ranks next to cotton in the South, may possibly take the leading place if the present rate of increase is maintained. The value of the 1942 crop is estimated at $100,000,000. The planting jumped from 1,914,000 acres in 1941 to approximately 5,000,000 acres this year.

The last week in January has been fixed as National Peanut Week, and from January 21 to 30, 1943, will be held the fifth annual celebration sponsored by National Peanut Council. Prizes will be offered for recipes; peanuts will be featured in dining rooms and cocktail lounges and served in the dining cars of the nation's railroads.

Feed Situation Favors More Meat

Quantities of important feed grains available in October of this year were the largest on record and were 11 percent greater than supplies at the same time in 1941. Also, larger supplies of oilcake and meal from vegetable oil producing operations will be available this year, and more wheat should be available for livestock feeding. Also, hay supplies are 9 percent above the previous year. Even with a greater number of livestock to be fed in 1943, the feed situation should be at least as favorable as in the past year.

The feed price situation is also favorable to the production of meat animals. Corn is lower because of the record harvest and the hog-corn price ratio is more favorable to livestock producers than at any time since 1926. Prices of oilseed meals and of millfeeds are also lower. These price levels promise relatively cheap feeds for the remainder of this year and for the first part of next year. Later in 1943, the continuation of favorable feeding ratios will be influenced by 1943 crop prospects.

As to meat production, hog slaughter in the year beginning October 1, 1942, is expected to reach 95,000,000, considerably above the preceding year. Cattle and calves on farms in early 1943 are forecast as larger in number than a year before, indicating that cattle slaughter can also be increased. In contrast, a slight reduction in slaughter of sheep and lambs in 1943 is expected.

Chicken and Egg Production To Rise

Total egg production in 1943 is expected to be 6 to 8 percent greater than in 1942, according to a report of the Bureau of Agricultural Economics, which states that, with increasing military and Lease-Lend requirements, per capita civilian supplies should be about the same. The per capita supply in 1942 is estimated at 315 eggs.

Supplies of chicken meat in 1943 are forecast by the report as likely to be larger than this year, with the per capita supply the highest on record. However, because of greater effective demand and also because of meat scarcity, it is likely that 1943 demand for poultry will be even greater than the supply.

CONSTRUCTION NEWS

	Pending (thousands)	Awarded November (thousands)	Total Awarded 1942 (thousands)
Bakery	.....	.....	$115
Beverages	$80	.....	1,227
Canning and Preserving	80	$40	545
Cold Storage Plants	.....	.....	625
Confectionery	.....	.....	.....
Grain Mill Products	170	.....	635
Ice Manufactured	100	.....	180
Meats and Meat-Products	40	40	263
Milk Products	280	91	1,732
Miscellaneous	255	103	4,427
	$1,005	$274	$9,749

Milk Supply Up Slightly Next Year

In spite of an increased number of milk cows expected on farms in 1943, it is not expected that milk supplies will increase greatly. Production in 1942 is expected to reach 120 billion pounds, and 1943 output is not thought likely to exceed this figure by much over 2 billion pounds. Lack of skilled labor, plus favorable opportunities to use available feeds in the production of meat animals, are important factors limiting the expansion of milk production.

Commodity Prices Show Little Change

With price ceilings now generally effective, foods and other commodities showed little price change during the four weeks from October 17 to November 14. The *New York Journal of Commerce* weekly index of commodity prices moved up slightly for the period, from 104.2 to 104.6. During the same time, the same publication's grain price index rose from 90.0 to 93.0 and the food price index rose from 106.8 to 107.2.

Spot prices of foods showed but little change for the four weeks from October 17 to November 14. Wheat, No. 2, hard winter, Kansas City, increased from $1.18 to $1.21¼. Flour was unchanged. Corn, No. 3, yellow, Chicago, rose from 76¾c. to 82c. Beef and pork loins were unchanged, but lamb increased from 25c. to 27c. Lard, eggs, cheese and butter showed no rise or fall. Imported food commodities were unchanged, while canned food prices were the same, except in cases where new pack prices had not been announced.

INDICATORS

Citrus products pack in Florida, 1942–1943 season, according to the *New York Journal of Commerce*, is expected to be made up of 2,500,000 cases of grapefruit, 10,000,000 cases of grapefruit juice, 1,200,000 cases of orange juice, and 1,500,000 cases of blended juice. This totals 15,200,000 cases, compared to a total last year of 14,500,000 cases.

Salmon pack in Alaska this year, according to final figures released by the Fish and Wildlife Service, totaled 5,015,375 cases, compared to 6,865,463 cases packed in 1941.

Milk, fluid, daily average sold in September, 1942, is reported by Milk Industry Foundation at 15.32 percent greater than in September, 1941.

Butter, creamery, produced in September, 1942, totaled 140,130,000 lb., 4 percent below output in the corresponding month of 1941, according to the U. S. Department of Agriculture. This production was 3 percent over average output for September in 1931–1940.

Butter, creamery, produced in the first nine months of 1942 was reported by the U. S. Department of Agriculture at 1,428,985,000 lb., a decrease of 5 percent below output in the corresponding months of 1941, but 5 percent over the average output in 1931–1940 for the same period.

Cheese, American, produced in September, 1942, totaled 70,675,000 lb. This figure is the same as for September, 1941, but is 70 percent above the 1931–1940 average for September.

Cheese, American, produced in the first nine months of 1942 was reported by the U. S. Department of Agriculture at 773,000,000 lb. During the corresponding period of 1941 output was 570,463,000 lb. and the 1931–1940 average output for the period was 380,902,000 pounds.

Eggs, frozen, packed in September, 1942, are reported by the U. S. Department of Agriculture to total 3,050,000 lb., compared to 2,845,000 lb. in September, 1941.

Eggs, whole, dried in September, 1942, totaled 20,632,925 lb., up 555 percent above the 3,148,271 lb. produced a year before, according to the U. S. Department of Agriculture.

Milk, dried skim, produced in September, 1942, is estimated at 44,000,000 lb., compared to 32,979,000 lb. in September, 1941. This output is 49 percent over the 1936–1940 average for the month.

Milk, dried skim, produced in the first nine months of 1942 totaled 515,000,000 lb., a 32 percent increase over the output of the corresponding months of last year.

Milk, whole, dried in September, 1942, is estimated at 5,900,000 lb., compared to an output of 3,352,000 lb. in September, 1941.

Milk, evaporated, produced in September, 1942, totaled 226,695,000 lb., compared to 290,634,000 lb. in September, 1941. Production in the first nine months of 1942 amounted to 2,985,070,000 lb., according to the U. S. Department of Agriculture.

Chicks hatched in September, 1942, are reported to total 22,323,000 up 17 percent from the corresponding month last year. For the first nine months of 1942, output of chicks was 1,107,644,000, an increase of 13 percent over production in the same months of last year.

Oleomargarine sales in September, 1942, as indicated by sales of internal revenue stamps, totaled 32,103,643 lb., 6.5 percent below sales in September 1941. For the first nine months on 1942, sales were 243,014,868 lb., 9.6 percent below the corresponding period of last year.

Cucumber pickle harvest in 1942 was 8,115,655 bu., one of the largest crops on record and 51 percent over the ten-year average, according to National Pickle Packers Association.

Fruits, frozen, in storage on November 1, 1942, totaled 219,387,000 lb., compared to 199,822,000 lb. on November 1, 1941, and to a November 1 average in 1937–1941 of 156,462,000 lb.

Vegetables, frozen, in storage on November 1, 1942, totaled 114,813,000 lb., compared to 98,839,000 lb. a year before.

Lard in storage on November 1, 1942, was 50,769,000 lb. and rendered pork fat on the same date totaled 5,466,000 lb. The total for the two products a year earlier was 177,426,000 lb., and the 1937–1941 November 1 average for the two products was 115,295,000 lb.

Meat, all kinds, in cure and frozen storage on November 1, 1942, totaled 461,308,000 lb., compared to 471,397,000 lb. on November 1, 1941, and to an average in 1937–1941 of 392,754,000 lb. for the same date.

Poultry, frozen, all kinds, in storage on November 1, 1942, was 161,208,000 lb. The figure on November 1, 1941, was 127,981,000 lb., and the average for November 1 in 1937–1941 was 95,073,000 lb.

Butter, creamery, in storage on November 1 of this year was 87,037,000 lb. A year earlier the figure was 186,635,000 lb., and the 1937–1941 average for the date was 142,748,000 pounds.

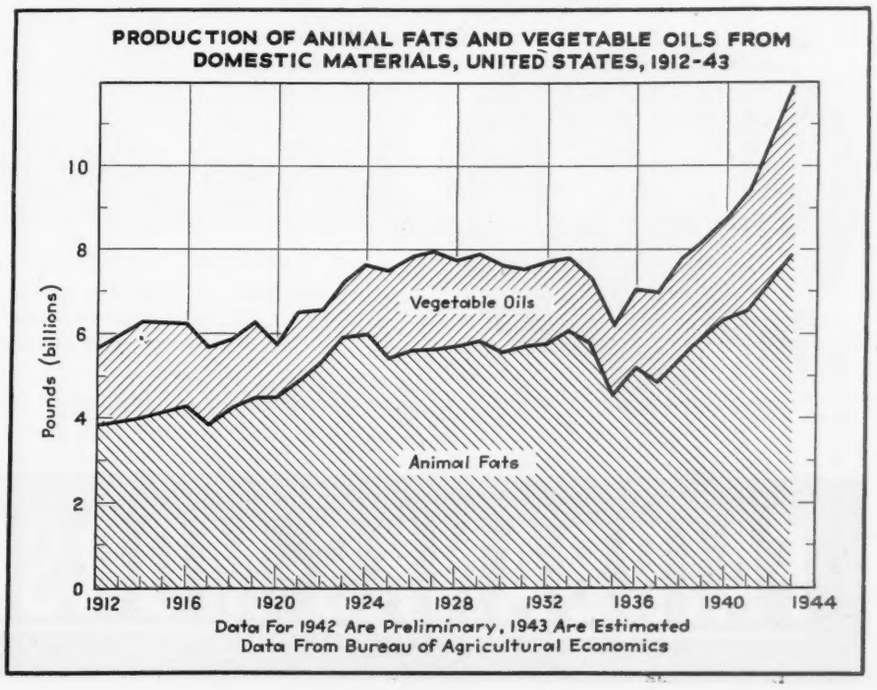
Cheese, all kinds, in storage on November 1, 1942, amounted to 194,997,000 lb., compared to 188,727,000 lb. on November 1, 1941, and to 138,730,000 lb., as a 1937–1941 average for the date.

Eggs, case equivalent, in storage on November 1 of this year totaled 4,822,000 cases, compared to 4,102,000 cases a year earlier and to a 1937–1942 average of 3,190,000 cases.

Weekly wholesale food price index of Dun and Bradstreet stood at $3.94 on November 10, 1942, a new 22-year high, and comparing to $3.31 on the corresponding 1941 date.

Business activity index of *Business Week* was 188.0 on November 7, 1942, compared to 187.2 a month before and to 160.7 a year earlier.

Cost of living index of National Industrial Conference Board for October, 1942, was 99.5, up from 98.6 a month before and 8.2 percent higher than in October, 1941.



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INDUSTRY

American Food Products Corp., Chicago, has begun operations at its new potato dehydration plant at Klamath Falls, Ore.

Bestovall Canning Co., Ltd., Vancouver, B. C., has begun construction of an addition to its plant which will be 240x150 ft., costing $35,000. Oil equipment will be transferred from the old plant.

Birds Eye Frosted Foods Sales Corp. has placed a new product in national distribution—mixed fruits, which combines apricots, boysenberries, raspberries and seedless green grapes. The product has been successfully introduced in test markets. Birds Eye has started operation of its new quick freezing plant in Harlingen, Tex., where string beans, broccoli and spinach are being processed.

Borden Co. has issued a new booklet, "Low Cost Adequate Diets," to help homemakers stretch the weekly food budget.

W. R. Carpenter Co., Ltd., Vancouver, B. C., plans to establish a plant in Hamliton, Ont., to produce vegetable oils.

Cranberry Canners, Inc., has started cranberry canning and dehydration at its recently constructed plant in Coquille, Ore.

Cudahy Packing Co., Chicago, has been awarded a Lease-Lend contract for 110,000 lb. of dehydrated pork. This pork will be processed in the Omaha, Neb., plant of the company and to date constitutes the largest single order placed for a dehydrated meat.

P. Duff & Sons, Inc., Pittsburgh, has founded an industrial fellowship for research on food processing and packaging, at Mellon Institute.

General Mills, Inc., has purchased the goodwill, trade marks, trade names, patents and patent rights, patterns, drawings, jigs and templates of the Great Western Manufacturing Co., Leavenworth, Kan., to be moved to Minneapolis where replacement parts for machinery in various General Mills plants will be made.

Helena (Ark.) Cotton Oil Co., recently organized, will broaden operations to include the crushing of soybeans, utilizing soybeans from the estimated 7,000 to 8,000 acres harvested in the territory this fall.

L. B. Henry Egg Drying Co., Dallas, Tex., has begun operation of its new plant in that city, dehydrating eggs exclusively for sale to the government.

Hunt Brothers Packing Co., San Francisco, has leased, with an option to buy, the plant, equipment and brands of Val Vita Products, Inc., Fullerton, Calif. The acquisition may boost Hunt Brothers sales to $18,000,000.

Miller Brothers Food Co., Edinburg, Tex., is establishing a new flash-freezing process for fresh vegetables at it new vegetable dehydration and quick-freezing plant in San Carlos, Tex. The company claims that the process can quick freeze six tons of green beans in 24 hours.

DR. H. N. BROCKLESBY

Borden Co.'s Special Products Division has appointed Dr. H. N. Brocklesby, noted authority on marine oils and vitamins, to its scientific staff, with headquarters in San Francisco. Dr. Brocklesby was former chief chemist of the Fisheries Research Board of Canada. He is a pioneer in the development of the halibut liver oil industry.

CORWIN WICKERSHAM

Corwin Wickersham, Standard Brands, Inc., vice-president, who has been in government service since November, 1941, recently as chief of the Foreign Requirements Branch, WPB, has been appointed a colonel in the Army, Service of Supply. He has been connected with the Fleischmann Co. and Standard Brands for the past 26 years.

HAROLD J. HUMPHREY

Harold J. Humphrey has been elected vice-president in charge of research of Snider Packing Corp., Rochester, N. Y.

Pacific Fisheries Experimental Station, formerly located at Prince Rupert, B. C., has recently moved to the building occupied by Coca-Cola Co. in Vancouver. Extensive changes will be made to the plant at a cost of $18,000.

Pet Milk Co. will construct a $50,000 addition to its plant in Sparta, Wis.

Pillsbury Mills Co.'s Springfield, Ill., staff has been selected to receive an Army-Navy "E" for outstanding performance in war work.

Rumford (R. I.) Chemical Works has designed a new informative label for its baking powder tins, establishing the calcium phosphate content of the product.

Swift Canadian Co., Ltd., is spending approximately $19,000 on improvements to its plant in New Westminster, B. C.

Universal Colloids Co. has successfully completed experimental runs at its plant in McAllen, Tex., and has begun volume production of dehydrated vegetables. A second dehydration plant is planned by the company.

Wheeling (Mo.) Canning Co. is planning to establish a branch plant at Chillicothe, Mo., in 1943.

Wilson Packing Co. soon will start converting part of its plant at Wilson, Ark., into a huge dehydration project, drying potatoes, carrots, onions, beets and cabbage for sale to the government.

PERSONNEL

W. Wade Ambrose, president of Westgate Sea Products Co., San Diego, Calif., has been elected president of California Fish Canners Association, succeeding Herbert C. Davis. Leland B. Irish is vice-president of the Association.

L. H. Crumley, Atlanta, Ga., has been named manager of the Birmingham branch of Swift & Co., succeeding J. L. Thweatt, who has been transferred to Baltimore.

John Douglass, director of meat operations for Kroger Grocery and Baking Co., Memphis, Tenn., has been promoted to branch manager in charge of operations at Springfield, Mo. He has been with the firm 23 years and formerly was district manager.

C. C. Eidt, designer of the center-exhaust dehydrating tunnel, has been transferred from the Experimental Station of the Canadian Department of Agriculture, Kentville, N. S., to the Central Experimental Farm, Ottawa.

Clarence Ford, Jr., former vice-president and sales manager, has been named operating head of Tom Houston Peanut Co., Columbus, Ohio. Col. Walter A. Richards, president of the concern, is on leave of absence in the Army.

Karl L. Ford has left Thatcher Glass Co. to join Hartford-Empire Co., Hartford, Conn., where he will be engaged in research on processing food in glass.

Theodore Garfield, formerly chemist for Standard Brands, Inc., baking powder department has entered the employ of Allen Wrisley Co., Chicago, soap manufacturers.

Harold Grosser, president of Bard's Dairy Stores, Pittsburgh, Pa., has been elected president of the National Association of Retail Ice Cream Manufacturers.

Ross E. Jones, Jr., traffic manager of H. J. Heinz Co., is on leave of absence to act as chief of the Transportation and Distribution Section of WPB's food branch.

J. Harry Letsche, Jr., manager of H. J. Heinz Co.'s personnel department, has been elected a member of the company's board of directors. He formerly held executive positions in the sales, manufacturing and accounting departments.

Joseph Manischewitz has been elected to the presidency of B. Manischewitz Co., baking concern with plants in Jersey City, N. J., and Cincinnati, Ohio. Bernard Manischewitz, plant manager, succeeds him as secretary of the company.

Richard B. Rice has been named Boston manager of Merckens Chocolate Co., Inc., Buffalo, N. Y., succeeding the late Oscar P. Sanders.

William E. S. Stoneman is now in charge of research, development and production for Hi-Grade Extract Co., Chicago.

FRANK K. GREENWALL

Frank K. Greenwall, president of National Starch Products, Inc., and a well-known figure in the packaging industry, has been elected a director of American Management Association. In addition, he has been appointed chairman of the Exhibitors' Advisory Committee of the Packaging Exposition, to be held in New York April 13-16 under the auspices of AMA.

Lee A. Wheeler has been reelected president of Florida Canners Association, Tampa, Fla. Vice-president is W. W. Giddings, Winter Haven.

M. R. Wilson, merchandising and sales specialist, has joined Northwestern Yeast Co. as sales promotion manager. He was formerly with Montgomery Ward & Co.

DEATHS

Frank Everett Clark, 82, retired president of New England Confectionery Co., recently, in Lexington, Mass.

Julius F. Geertz, 71, retired vice-president and managing director of W. A. Taylor & Co., New York wine importers, Oct. 25, in Montclair, N. J.

Linwood C. James, president of National Packing Co., Nov. 10, in Baltimore, Md.

Otto A. Kerber, 85, a founder of Kerber Packing Co., Elgin, Ill., recently, in Aurora, Ill.

D. C. Nevitt, 63, Atlanta, Ga., district sales manager for National Biscuit Co., Oct. 31, while en route to Miami, Fla.

Harry O'Grady, 62, general manager of the Cudahy Packing Co. plant at Sioux City, Iowa, Nov. 10, in Sioux City.

Henry James Parrish, 83, former president of National Cotton Seed Products Association, recently, in Memphis, Tenn.

James Polles, 55, sales manager of Mell-O-Made Ice Cream Co., Paterson, N. J., Oct. 29, in Butler, N. J.

Edward Purdie, 64, president of Purdie Wholesale Grocery Co., Dunn, N. C., recently, in Dunn.

George M. Simmons, 59, vice-president and director of National Starch Products, Inc., Oct. 26, in Brooklyn, N. Y.

George Lincoln Teller, 75, pioneer in cereal chemistry work and president of Columbus Laboratories, Nov. 13, in Chicago, Ill.

William C. Todd, president and managing director of J. H. Todd & Sons, pioneer cannery operators of Victoria, B. C., recently, in Victoria.

Max Weiss, founder and president of Queen Anne Candy Co., Nov. 10, in Hammond, Ind.

ASSOCIATED INDUSTRIES

Allis-Chalmers, Milwaukee, Wis., has announced the appointment of H. P. Binder as manager of the centrifugal pump department. He has been assistant manager of the hydraulic department.

American Machine and Foundry Co., Brooklyn, N. Y., has announced that Morehead Patterson, president, has been appointed by Rubber Administrator Jeffers as assistant to Bradley Dewey, deputy administrator of the Rubber Board.

Carrier Corp., Syracuse, N. Y., and the Huntington, W. Va., plant of International Nickel Co. have won their third production awards, an Army-Navy "E" pennant with two stars. Each star represents the renewal of production honors for a six-month period.

De-Raef Corp., Kansas City, Mo., has reported the death of Peter N. Miller, Oct. 30, in Birmingham, Ala.

Duriron Co., Inc., Dayton, Ohio, and the Vilter Manufacturing Co., Milwaukee, Wis., have been awarded the Army-Navy "E" for war production. Armstrong Cork Co.'s Lancaster, Pa., floor division and closure plants also won the award.

Goodyear Tire and Rubber Co. has announced that for the duration Pliofilm will be processed for U. S. Army and Navy use. An emulsified pliofilm known as Transphoto film is used in the airplane and similar industries in fabrication of templates.

Hoffman-La Roche, Inc., Nutley, N. J., because of increased production, has lowered the price of vitamin B_1 (thiamin). Shipments of 100 grams or more are now $0.37 per gram; shipments of less than 100 grams are $0.40 per gram.

Sylvania Electric Products, Inc., has announced the appointment of Don G. Mitchell as vice-president in charge of sales. Mr. Mitchell was previously with American Can Co. and with Pepsi-Cola Co.

FOOD EQUIPMENT NEWS

Spray Drying System

DRYING & CONCENTRATING CO., 332 South Michigan Ave., Chicago, is now manufacturing a spray drying system suitable for the dehydration of liquid food products or solid and liquid mixtures such as pureed tomato or other vegetables.

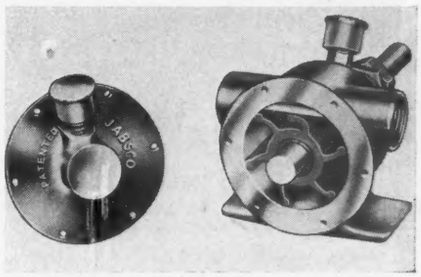
As shown in the accompanying drawing, this system in its usual form consists of an indirect heating unit which may be oil or gas-fired, or may use steam coils, in which the drying air is heated, also a concentrating unit in which part of the moisture is removed, and a drying chamber which performs the final drying. In operation, the fluid to be dried is introduced into the concentrating chamber by means of a centrifugal spray head. There it comes in contact with air exhausted from the drying chamber. After concentration, the fluid passes through a filter and is then pumped to a centrifugal spray head in the main drying chamber where it is intimately mixed with a rapidly swirling current of heated air direct from the heaters. As the dried particles of food fall to the bottom of this drying chamber, they pass first through a cooler where they are cooled by a current of cooled air and then through an air lock valve and a screen to the packaging setup.

The manufacturers of this system state that no dust collector or separator is necessary with it, as the centrifugal force of the air current in the drying chamber is sufficient to knock all particles out of the air current, by striking them against the side of the chamber and causing them to fall to the bottom.

The manufacturer states that many products have been dehydrated in this dryer, including various forms of milk and eggs, gelatine, meat, poultry, potatoes, onions, carrots, spinach, tomatoes, soybean protein, and kidney extract. When drying materials having a high solid content, or where a plant of comparatively low production is desired, the concentrator is omitted from the system.

Flexible Impeller Pump

JABSCO PUMP COMPANY, 8304 Wiltshire Boulevard, Beverly Hills, Calif., has brought out a pump designed to pump either thick or thin liquids without requiring priming when starting. This pump has but one moving part, a flexible impeller made of Neoprene. This impeller fits snugly inside the pump housing and creates a partial vacuum during revolution, thus eliminating any need for priming. It is claimed that this impeller allows a certain amount of solid material to pass through the pump without any clogging



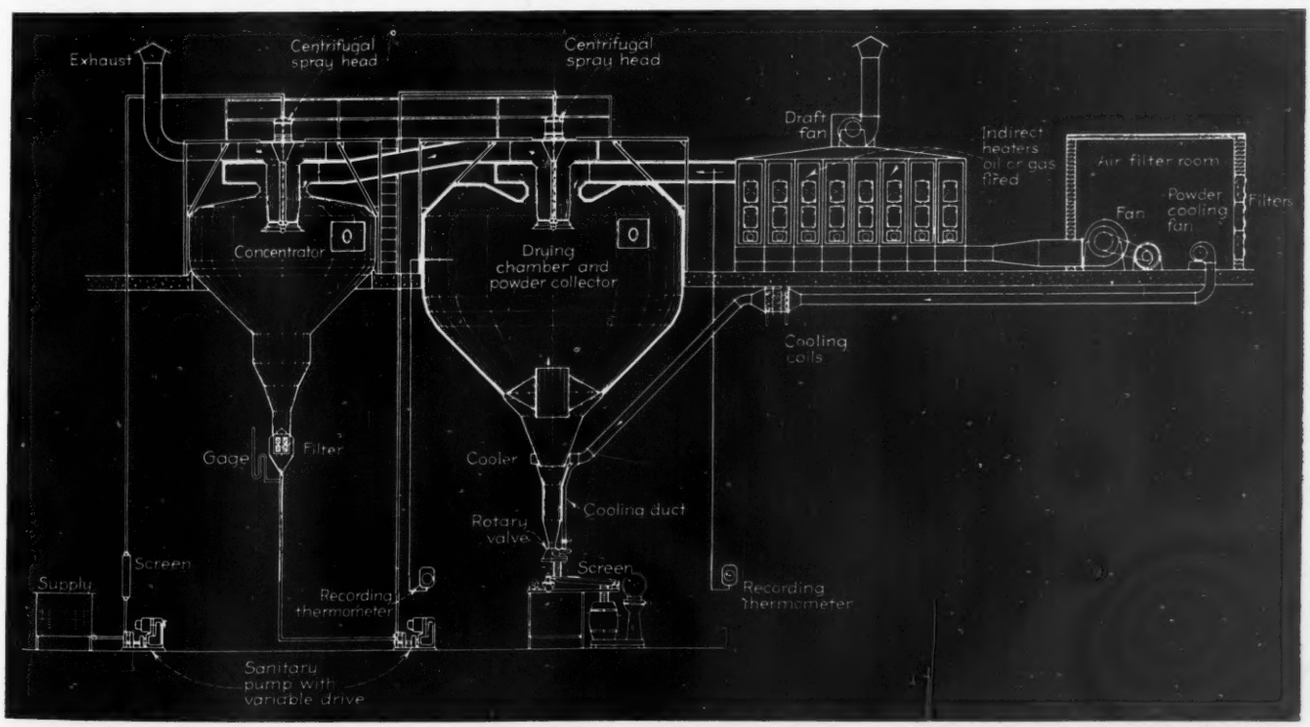
New pump with flexible impeller.

or injury to the parts. It is also claimed that friction is low, thus reducing operating costs and lengthening the life of the pump.

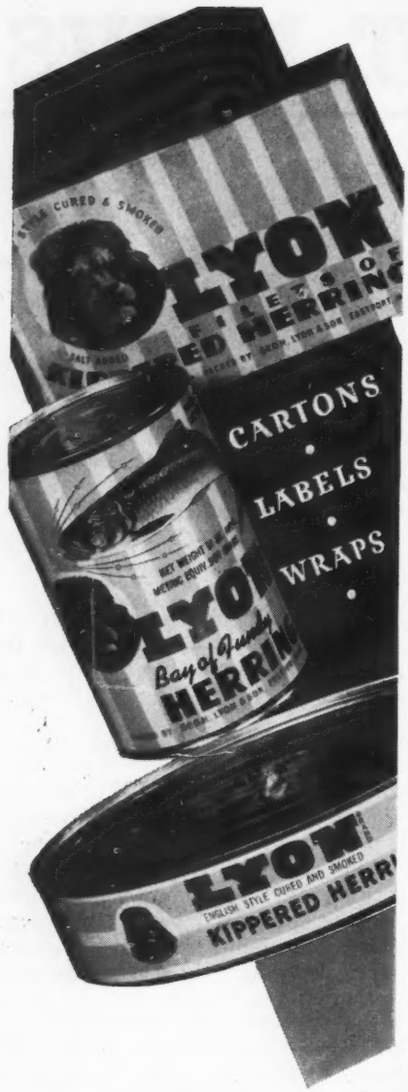
The new pump is for low-pressure service for capacities of 2½ to 22 gal. per minute and is available in sizes from ¼ to ¾ in.

Protective Coating

DAVID C. BROWN CO., 17532 Wisconsin Ave., Detroit, Mich., is marketing a protective coating under the name of "Resi-Flex." This is a transparent resin coating said to have unusual properties for protecting metal, wood, fabric, paper and composition material under various types of exposure. In making the product, the formula may be adjusted to accent one or more of the following properties: Resistance to alkalis, resistance to inorganic acids, resistance to



Spray drying system for food products employing a concentrator for removing part of the moisture before final drying occurs.



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oils or alcohols, flexibility and resistance to scratching.

The coating is made in both the air drying and baking types and may be brushed or sprayed. The air-drying types are offered mainly for the purpose of protecting blueprints, photographs, tracings and other such material from fire, stain or water damage. The baked-on types, used more for the protection of parts and equipment, must be baked at 250 to 375 deg. F. for 6 to 30 minutes, depending upon the size and type of the material being coated. When required, several coats of the material may be built up on the part.

Plastic Window Panes

MONSANTO CHEMICAL CO., Springfield, Mass., has developed a new type of window pane made from transparent plastic laminated with wire mesh. This pane is said to withstand the explosion of 150-lb. bomb when only 8 ft. away. It has been developed for use in industrial plants where there is danger of air raids. The manufacturer states that when tested under vacuum shock conditions, this window pane has stood up without appreciable damage under 28 in. vacuum. Panels of this material are available in eight standard sizes ranging from 9½ in. square to 19½x24½ in.

Wet Strength Paper

BROWN COMPANY, 500 Fifth Avenue, New York, is making "Aqualized" paper, a product with high strength when wet, put forward as a substitute for cloth and burlap.

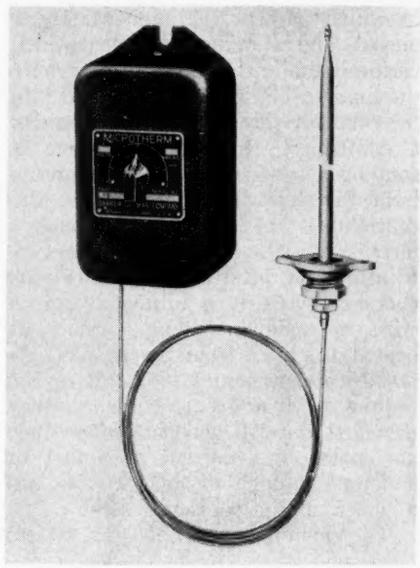
This paper is produced by a new process said to effectively interlock and fasten individual fibers in the paper, giving inherent wet strength. It is available in several types, some being highly absorbent while others are made to repel water.

Suggested uses in the food field for this paper include: potato bags, crate linings, wraps for meats, and locker bags for frozen foods.

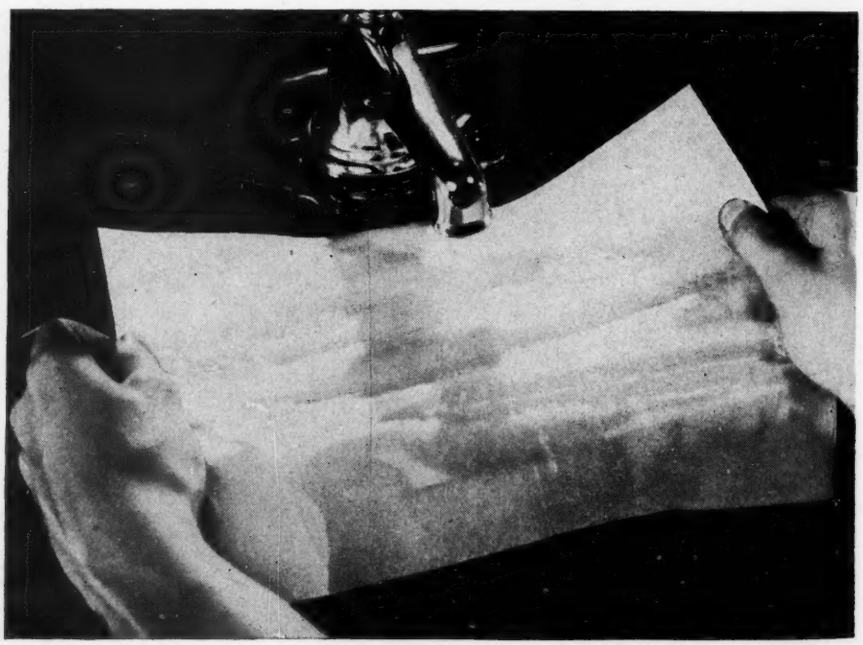
Remote Controller

BARBER-COLMAN CO., Rockford, Ill., is making the "Remote Bulb Microtherm" for the purpose of controlling temperatures in ducts, tanks, liquid lines, dryers, cooking kettles and similar equipment.

This apparatus is a liquid-filled, remote bulb, proportioning thermostat.



Remote control type of temperature controller.

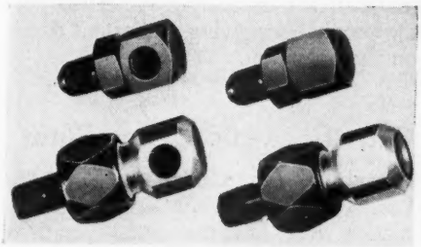


"Aqualized" paper, a high wet strength product offered as a substitute for cloth or burlap.

Its use is indicated where it is desirable to mount the mechanism where it is readily accessible, free from vibration, dust, dirt or increased temperature. These thermostats are available with or without armored tubing.

Straight and Angle Swivels

TRABON ENGINEERING CORPORATION, 1814 E. 40th Street, Cleveland, Ohio, has introduced a line of straight and 90-deg. angle swivels for use in oil,



Straight and angle swivels for pipe line connections.

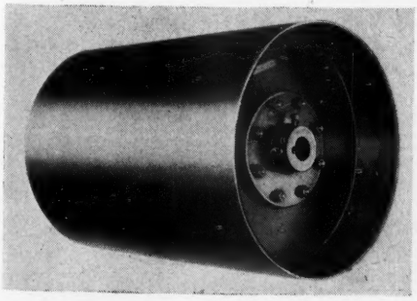
grease, air and other pipe line connections in stationary and moving surfaces. These swivels are available in two different constructions for different requirements. Standard ball bearing swivels are available in $\frac{1}{8}$, $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{3}{4}$ and 1-in. pipe sizes. Because of the ball-bearing construction, this type turns freely at any pressure without binding and is recommended for use wherever space permits.

The other type is a light duty swivel, built without ball bearings and intended for use only in lighter work where space limitations do not permit the use of the standard type. It is offered only in the $\frac{1}{8}$ and $\frac{1}{4}$-in. pipe sizes.

Both models are furnished regularly with right-hand threads on both the head and the stem. Swivels with left-hand threads on either head or stem or both, and swivels built of special materials to avoid corrosion, can be furnished on special order.

Conveyor Pulleys

AMERICAN PULLEY Co., 4200 Wissahickon Ave., Philadelphia, Pa., has brought out the "Type N" pulley,



Tight-end pulley for belt conveyors.

Save Time in VITAMIN A Determinations

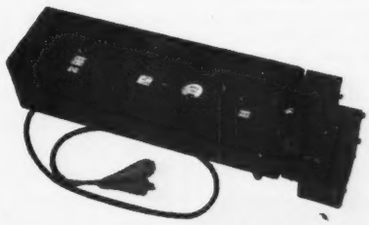
...Workers have indicated the ultraviolet absorption to be a more reliable index of Vitamin A content than antimony trichloride reaction with its attendant complications.
—Wilkie: U. S. Food & Drug Admin.

with the Beckman Spectrophotometer

The Beckman Spectrophotometer has already proved itself to be the fastest, simplest, and most accurate method for Vitamin A determinations. And, because the Beckman Instrument covers not only the visible and near ultraviolet, *but the complete range of ultraviolet* down to 220 mmu—this is the *only* spectrophotometer capable of handling ALL types of modern vitamin determination and control work!

Step up the speed, accuracy, and convenience of *your* vitamin work with the BECKMAN Spectrophotometer—the one spectrophotometer with *full range* to cover all present day vitamin work as well as future developments in this field!

Important Features of the Beckman *Spectrophotometer*



▶ **Entirely Self-Contained:** The monochromator, light sources, phototubes, and electrical measuring circuit are all incorporated within the instrument to insure maximum convenience, ruggedness, and accuracy.

▶ **Easy to Operate:** Measurements are quick and simple to make. Direct readings in both % Transmission and Density can be made *simultaneously*.

▶ **Remarkably Versatile:** Interchangeable light sources, interchangeable phototubes, a monochromator with full range (220 mmu in the ultraviolet to 1000 mmu in the infrared) enable the instrument to meet all the varying requirements of research and control work with no sacrifice in convenience or accuracy.

▶ **Highly Accurate:** Although unusually simple to operate and remarkably versatile, the instrument is extremely accurate over the full scale, even with low light intensities. Stray light effects are less than 1/10 of 1% over most of spectral range.

▶ **Ruggedly Built:** Optical parts are rigidly mounted in a massive heat-treated iron block, within a hermetically sealed metal case. All parts are designed for long life and sustained accuracy.

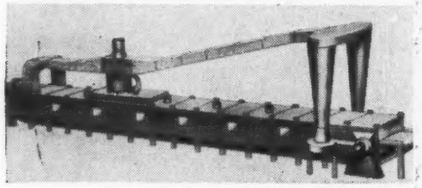
Send for complete information on the Beckman Spectrophotometer. Describe the application you have in mind and our experienced engineering staff will gladly make helpful suggestions on the use of this instrument in *your* work.

NATIONAL TECHNICAL LABORATORIES, South Pasadena, Calif.

Beckman INSTRUMENTS SPEED PRODUCTION ...REDUCE WASTE

DEHYDRATION

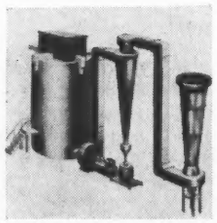
SLICES
CUBES
STRINGS



The Bowen "De-Hy" is designed to dry foods without the risk of the product becoming rancid or taking on the "hay-taste" that usually occurs a few months later after storage. The "De-Hy" uses an inert atmosphere to help insure this necessary step. If you have problems concerning the dehydration of foods write for the 12 page illustrated booklet that describes the process.

1. NO OXIDATION
2. NO CASE-HARDENING
3. TIME-TEMPERATURE AT A MINIMUM

POWDER



The Bowen Spray-Dryer is designed for reducing soups, milk, coffee, fruit juices, etc. to a uniform fast flowing powder. Bowen engineers will be glad to answer any problem you may have regarding Spray-Drying.

ILLUSTRATED DATA AVAILABLE

Bowen Research Corporation

BOWEN

70 MAPLE STREET GARWOOD, N. J.

Please send me a copy of "Dehydration" without charge.

Name.....

Company.....

Street.....

City.....State.....

made with tight ends for easy cleaning in belt conveyor installations. This pulley is designed so that no spilled material, dust or water can accumulate within. It is made of rolled steel, is light in weight and is available in diameters from 6 to 36 in. The pulleys are equipped with removable interchangeable hubs for quick, easy mounting.

Maintenance Paint

AMERICAN-MARIETTA Co., 43 E. Ohio St., Chicago, has brought out a new paint for industrial maintenance purposes called "Valdura Single-Kote." The purpose of this paint is to prime, seal and finish interior surfaces with one coat. The manufacturer claims that it combines the hiding power and economy of water-type paints with the washability, durability and performance of oil-type paints. This paint may be put over practically any old surface as long as it is tight to the wall and is not oily or greasy. The paint is said to set within two hours, dry within four hours and provide a dead flat finish when viewed at a 90-deg. angle. It comes only in white, but may be tinted by using alkali resistant colors in oil.

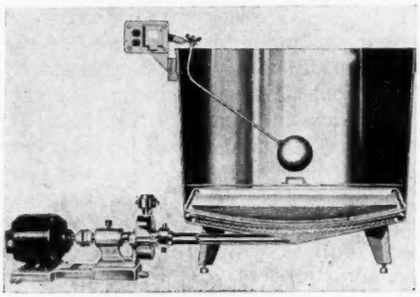
Moisture Tester

THE "Steinlite" moisture tester made by the Fred. Stein Laboratories, Inc., and distributed by Seedburo Equipment Co., 223 W. Jackson Blvd., Chicago, is a device developed for determining the moisture content of samples of dried products such as dehydrated vegetables, grains and similar materials. The operation of this instrument is based on the principle of radio frequency impedance. This impedance varies with the moisture content of the grain being tested and the variations are shown on the dial of the meter.

In operation, the electric current to the instrument is first turned on, allowing it to warm up for a minute or so. Then an initial adjustment is made by setting a small control knob. Next, a sample of the material to be tested is weighed out and this sample is placed in the test chamber. When the needle on the meter dial comes to a standstill, the reading is taken, and this reading is converted to a moisture percentage by means of a calibration chart for the material being tested. The sample is then removed from the test chamber by means of a slide drawer at the bottom. The whole operation takes only a minute or so, and in this way readings can be taken as rapidly as needed during production, giving a constant check on the operation.

Gravity Suction Type Filter

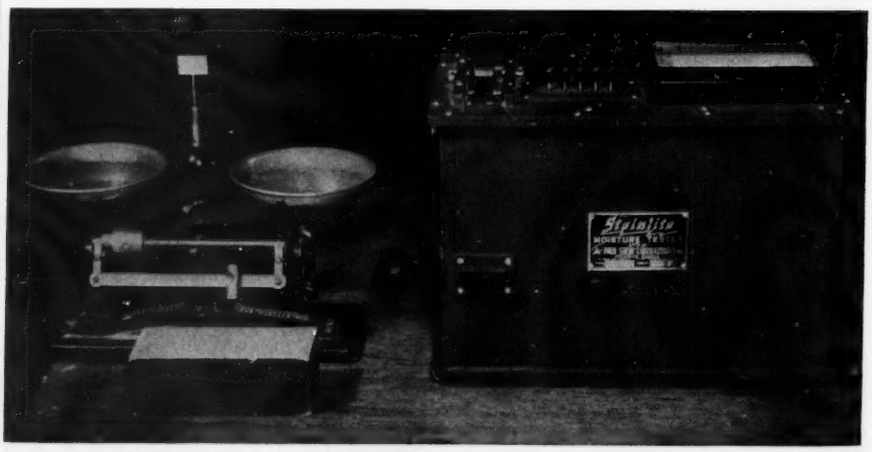
DAMROW BROS. COMPANY, Fond du Lac, Wis. has brought out a gravity suction type filter for such operations as the cold filtering of fluid milk at the dairy plant.



Gravity suction type filter for fluid milk.

In this filter, the filter cloths can be changed with only momentary interruption of the process. The cloth can be inspected at any time without taking the filter apart.

Among the advantages claimed for this new equipment are; removes dirt and solids as the milk comes to the plant; churned butter fat cannot clog filter; the milk is handled as fast as it is received; the filter combines a filter

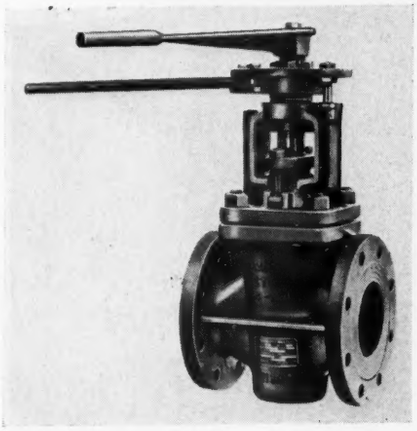


Moisture testure for dehydrated foods and other dried products.

and receiving tank in one piece of equipment. The device is simple to operate, operating with gravity flow and pump suction.

Plug Valve

HOMESTEAD VALVE MANUFACTURING COMPANY, Corapolis, Pa., has brought out a line of "Lever-Sealed" plug valves for pressures up to 150 lb. These new valves have been made with face-to-face dimensions of each size in the line the same as those of the corresponding sizes of wedge-gate valves. It is said they can be interchangeable with the gate valves without making any changes in the pipe line. Another feature claimed for these valves is the quick "quarter-turn" operation and the powerful leverage it provides for positive opening or shut-off under all conditions.



New line of quick opening plug valves.

Sizes in this new line of valves range from 1½ to 10 in. Valves are available in either steel or semi-steel.

Factory Equipment of Wood

LYON METAL PRODUCTS, INC., 3041 Clark St., Aurora, Ill., is now producing factory equipment made from wood, in order to eliminate the use of scarce metals.

Among the items offered are lockers having a hardwood top, bottom and frame. The back, sides and doors of the locker are of pressed wood, the door consisting of two panels mounted on a hardwood frame. These lockers come in five stock sizes, four single tier sizes and one double tier.

Another item is cabinets having top, bottom and frame of hardwood with back and sides of pressed wood. In these cabinets, the doors are of similar construction to the locker doors and are attached with three tight-pin hinges. These cabinets come in three types: storage, wardrobe and combination, and in two sizes: 36x18x72 in. and 36x24x72 in.

HIGHER EDUCATION

AS LEARNED FROM A SCHOOL OF SALMON

This 1500-can "school" of salmon is literally swimming with practical lessons in materials handling.

HERE'S LESSON NO. 1: You can increase usable warehouse space by stacking higher. Towmotor, the "one man gang," stacks loads as high as 25 feet.

HERE'S LESSON NO. 2: You can make manpower more productive by handling bigger loads as units. One man and a Towmotor pick up 1000 to 10,000-pound loads without straining a muscle.

HERE'S LESSON NO. 3: You can help lick the transportation problem by speeding receiving and shipping. Towmotor works 'round the clock . . . hustling capacity loads through narrow aisles, up ramps, along platforms, into freight cars and back at speeds up to 10 miles an hour.

Net result? Space, time, money and shipping facilities are saved. That's why dozens of manufacturers, warehousemen and shippers have already graduated to Towmotor . . . why many more will in days to come. Interested? Then send for a free copy of our new booklet, "The Inside Story." Write direct to Towmotor Company, 1222 East 152nd Street, Cleveland, Ohio.

TOWMOTOR

ARMY E NAVY

THE 24-HOUR ONE-MAN-GANG

ARMSTRONG'S FOAMGLAS INSULATION AVAILABLE FOR PROMPT DELIVERY

New fireproof, vaporproof insulation for low temperatures meets many requirements

ARMSTRONG'S Foamglas is available now for prompt delivery. It can be furnished for low temperature insulation construction with or without a priority rating.

This new form of glass is entirely made up of sealed cells. This cellular structure makes Foamglas light, strong, and effective for heat insulation. Each sealed cell is under a slight vacuum, thus increasing its insulating efficiency.

Foamglas is unique in the qualities it offers for service in the low temperature field. Look at all these advantages:

Moistureproof: Foamglas is not only waterproof, but even more important, it is vaporproof. No airborne moisture can get into or through this insulation. Being glass, Foamglas will keep its original insulating value *permanently*.

Structurally strong: Foamglas has a compressive strength of 130 lbs. per sq. inch. It has a wide range of possibilities for use where both insulating value and structural strength are important.

Fireproof: Foamglas is glass—it will not burn.

Permanent: Foamglas is proof against all common forms of deterioration. It is also verminproof and odorless.

Easy to erect: Strong, rigid, light in weight, Foamglas can be sawed and worked with ordinary tools.

Convenient size: Foamglas is made in one size, 12″ x 18″. Thicknesses available are 2″, 3″, and 4½″.

Readily available: Foamglas is not made of critical materials; thus it can be supplied in quantity for both priority and non-priority work.

Get this FREE booklet

Whether or not you're planning insulated construction now, get full facts about this new, permanent addition to the Armstrong Line of quality insulating materials. A new, illustrated booklet has a brief table of properties Write for your free copy today. Armstrong Cork Co., 916 Concord St., Building Materials Division, Lancaster, Penna.

ARMSTRONG CORK COMPANY
Insulation Headquarters

Corkboard • Cork Covering • Temlok • Fiberglas* • Mineral Wool Board • Foamglas
*Reg. U. S. Pat. Off. O.-C. F. Corp.

JUST OFF THE PRESS

BOOKLETS • LITERATURE • BULLETINS

FOOD PLANT EQUIPMENT

Air Conditioning Equipment – "Uni-flo" grilles and "Venturi-Flow" overhead diffusers for air conditioning systems are described and illustrated with specifications and installation drawings in 24-page catalog No. F-1415-4, published by Barber-Colman Co., Rockford, Ill.

Equipment Maintenance—"Civilian Conservation of the B.T.U." is the title of a booklet giving instructions for the simple care of air conditioning, refrigerating and heating equipment, issued by Carrier Corporation, Syracuse, N. Y.

Hoisting Equipment—"Lo-Hed, The Balanced Hoist," is the title of a condensed catalog describing classes and types of Lo-Hed hoists, with capacities, ratings, weights, hoisting speeds and heights of lifts, issued by American Engineering Co., 2446 Aramingo Ave., Philadelphia, Pa.

Power Lift Trucks—"The Inside Story of Towmotor" is the title of a new illustrated manual completely describing the construction and use of gasoline-powered factory lift trucks, published by Towmotor Co., 1226 E. 152 St., Cleveland, Ohio.

Processing Equipment—Basic machinery for the processing industries, including crushing, grinding and milling equipment, separators and sifters, washing, disintegrating and material-handling equipment, is briefly discussed with diagrams of operating principles and photographic illustrations in 12-page Bulletin B-6177-A, issued by Allis-Chalmers Mfg. Co., Milwaukee, Wis.

Rubber Belt Conservation—Practical hints, illustrated by photographs, and methods for the maintenance and conservation of rubber belting are given in a new 8-page bulletin issued by B. F. Goodrich Co., Akron, Ohio.

PLANT SUPPLIES

Centrifugal Pumps—Bulletin B-6059-H, describing a complete line of centrifugal pumps, single and double-suction, single and multi-stage, mixed and axial flow, has been issued by Allis-Chalmers Mfg. Co., Milwaukee, Wis.

Circuit Breakers—Indoor oil circuit breakers, Classes 150-TCR-3, and 250-TCR-3 for 600, 1,200 and 2,000-amp. ratings, with interrupting capacities of 150,000 kva., and 250,000 kva., are described and illustrated in 12-page Bulletin No. 3350, published by Roller-Smith Co., Bethlehem, Pa.

Electronic Tubes—A quick selection chart for industrial electronic tubes with technical data on applications and tubes has been prepared by the Radio Television and Electronics Department, General Electric Co., Schenectady, N. Y.

Maintenance Materials – "Steelcote" materials for maintenance and repair, including "Damp-Tex," an enamel that can be applied over water-soaked surfaces, whether wood, concrete, steel, brick or plaster, and "Floor Resurfacer" for resurfacing and repairing worn or broken floors of wood and concrete, are the subjects of recent publications issued by Steelcote Mfg. Co., St. Louis, Mo.

Motors—"Lo-Maintenance" electric motors of various types for industrial application are briefly discussed in 12-page Bulletin B-6052-C, issued by Allis-Chalmers Mfg. Co., Milwaukee, Wis.

Special Steels—A handbook of special steels, their properties and uses, together with 42 pages of tables and reference material, has been published in the form of a 128-page loose-leaf book by Allegheny Ludlum Steel Corp., Pittsburgh, Pa.

V-Belt Drives—Selection information for use in multi-belt drives of the Texrope V-Belt type is given in Bulletin B-6051-C, published by Allis-Chalmers Mfg. Co., Milwaukee, Wis.

V-Belt Maintenance—"Facts on War-Time Care of Rubber V-Belts" is the name of a handy 15-page guide for the maintenance man, published by Allis-Chalmers Mfg. Co., Milwaukee, Wis.

CONTROL EQUIPMENT

Flow Meters—A 56-page illustrated catalog describing a complete line of flow meters, including electric, mechanical, linameter, ring balance, liquid level and weir meters; also a two-pen electric flow recorder with ratio indicating pointer, a low-pressure electric arc meter, and an ultra high-pressure ring balance meter; has been published by the Cochrane Corp., 17th & Allegheny Ave., Philadelphia, Pa.

Heat Control—A compensated control system for the zone control of building heating is briefly described in Leaflet F-1756, issued by Barber-Colman Co., Rockford, Ill.

Pyrometers—The indication, recording and control of temperatures by means of "Micromax" thermocouple pyrometers is fully described with descriptions of various types of instruments, accessories and their specifications in 56-page illustrated Catalog N-33A, published by Leeds & Northrup Co., 4934 Stenton Ave., Philadelphia, Pa.

PACKAGING

Colors for Packages—Two new folders, one describing the "Color Harmony Manual," a book designed to help in obtaining objectives in color balance and harmony in accordance with scientific principles; and the other describing the "Color Harmony Index," a visual index for use in matching colors and inks, have been published by the Container Corporation of America, 111 W. Washington St., Chicago, Ill.

LABORATORY EQUIPMENT

Laboratory Equipment—Combination multiple stirrer and heating racks, also "Vari-Heat" extraction racks are described in two recent leaflets published by Precision Scientific Co., 1730 N. Springfield Ave., Chicago, Ill.

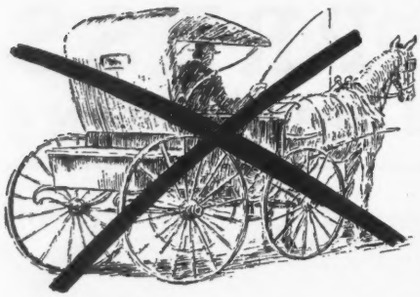
Laboratory Ovens—"Despatch" laboratory ovens for carrying out drying tests are described in 4-page Bulletin No. 105, published by Despatch Oven Co., Minneapolis, Minn.

Laboratory Supplies—Filter papers, both the "Ash-Low" and the "Ash-Free," are described with specifications in a recent publication of Carl Schleicher & Schuell Co., 116 West 14th St., New York.

Precision Balances—Two new types of precision balances for the accurate and rapid repeated weighing of small particles—from 3 mg. to more than 50 grams—are described, illustrated and listed in Catalog No. 4550, published by Roller-Smith Co., Bethlehem, Pa.

Protective Glassware—"Pyrex" Lifetime Red low actinic glassware, a colored laboratroy glassware affording protection to light sensitive materials such as vitamin materials, and other type of new laboratory glassware are described in Supplement No. 1 to Catalog LP-21, issued by Corning Glass Works, Corning, N. Y.

Vitamin Determination Instruments – A new instrument for the determination of vitamin A by ultra-violet absorption and vitamin B_1 and B_2 by fluorescence, called the "Photovolt" electronic photometer, is described in a folder recently issued by Photovolt Corp., 95 Madison Ave., New York.



It's the "Machine Age" for the

POTATO CHIP BUSINESS *too!*

"Horse and Buggy" methods of producing chips can't possibly compete with

FERRY

CONTINUOUS POTATO CHIP MACHINES

Old-fashioned methods are not only more expensive, but the quality is inferior to the product of these completely automatic machines. One operator can turn out 250 lbs. of perfect chips per hour without fatigue, because from raw peeled potatoes to finished chips his only job is to inspect the slices and control machine. Scores of Ferry machines have been in operation for many years, producing top-quality, top-profit chips all day and every day . . . Write for Bulletin F.I. which gives complete details on our various models.

J. D. FERRY CO.

129 SO. CAMERON ST.

HARRISBURG, PA.

BOOKS

Insecticide Technology

CHEMISTRY OF INSECTICIDES AND FUNGICIDES. By Donald E. H. Frear. Published by D. Van Nostrand Co., 250 Fourth Ave., New York. 1942. 300 pages; 6x9¼; cloth. Price $4.

This book developed from lecture notes used in a graduate course dealing with the chemistry of insecticides and fungicides. It is a contribution in a field in which too little information has been available. The book is directed particularly to teachers and research workers in economic entomology, plant pathology and horticulture, that is, to those already familiar with the applications of the insecticides and fungicides. It therefore concerns itself almost entirely with the nature of the substances used, rather than with practical problems of effectiveness, cost, and availability.

In addition to chapters on the various groups of fungicides and insecticides, there are chapters on wetting and sticking agents, spray residue removal, and analytical methods.

Each chapter includes an extensive list of references which should be very helpful in view of the scattered sources of information in this field.

Unusual Recipes

CROSS CREEK COOKERY. By Marjorie Kinnan Rawlings. Charles Scribner's Sons, 597 Fifth Ave., New York. 1942. 230 pages; 5¾x8½; cloth. Price $2.50.

This is probably the first time that FOOD INDUSTRIES' Books department has entertained a Pulitzer Prize winner. Mrs. Rawlings has not only produced a delightful book, built around old favorites and unusual recipes, but a book which can be recommended to anyone concerned with food formulas and food processing. The recipes are for "company" dishes, but the emphasis is on carefully selected, fresh ingredients, cooked to preserve the natural flavors.

Sugar Manual

MANUAL OF SUGAR COMPANIES. Published by Farr & Co., 90 Wall St., New York, N. Y., 1942. 190 pages; 5¼x8 in.; paper. Price, $1.

Now in its twentieth edition, the manual contains important statistics of sugar companies and the sugar industry, with other general information of reference value. Data on the financial structure, production and earnings of the sugar companies are given. And there are statistical tables giving sugar production, yields, prices and consumption.

Among the special subjects treated in this edition are United States sugar control, with an outline of the Sugar Act of 1937 and amended acts, sugar quotas of 1941, ceiling prices and rationing in 1942, and so forth. Historical and descriptive sketches of the beet sugar industry of the United States and of the cane sugar industries of Louisiana, Puerto Rico and the Dominican Republic are included, along with information about the sugar industries of British West Indies and Hawaii.

Coffee Processing Primer

THE COFFEE MAN'S MANUAL. By Payson Mackaye. Published by the Spice Mill Publishing Co., 106 Water St., New York, N. Y., 1942. 76 pages; 5¼x7¼ in.; paper.

Here is a primer of coffee processing, a little book that tells in a concise and interesting manner the story of coffee from blending to grinding. It probably will be of no practical help to coffee processing experts, though it will no doubt give them some enlightening background information. But the manual will be of greatest value to newcomers to the industry or those oldtimers who have never troubled to acquire an overall understanding of their business.

Incorporated into the book are a diagram of a modern roasting plant and pictures of processing and handling equipment. Some cost data are given, including a table of green and roasted cost of coffee for shrinkage of 16 percent. The chapters on the different phases of coffee processing are practical in their treatment, if brief.

Blending and processing coffee requires considerable skill and careful control, for the coffee bean is a raw material the value of which as a finished product is entirely at the mercy of the processing operations.

Food Bibliography

INDEX TO THE LITERATURE OF FOOD INVESTIGATION. Vol. 13 No. 3. Published by His Majesty's Stationery Office, London, and available in America through the British Library of Information, 30 Rockefeller Plaza, New York, N. Y. 226 pages; 6x9½ in.; paper. Price, 4s. 6d.

Well over a thousand technical articles pertaining to problems of food technology are listed in this index and their scope defined, which makes the index an excellent bibliography. The index is not limited to the literature of Britain but is international in scope.

Brief Summaries Of Grade Standards

(*Continued from page 67*)

Color—To receive a score of 34 to 40 points the strawberries must possess a practically uniform good red color, with as much or more red than Plate 3, J-1, but with no more grey than Plate 4, J-1.[1]

If the strawberries possess a reasonably uniform red color, a score of 28 to 33 points may be given. "Reasonably uniform red color" means that the berries possess as much or more red than Plate 3, H-1 and no more grey than Plate 5, H-1.[1]

If the color of the strawberries is decidedly irregular or if the strawberries fail to meet the requirements of the paragraph above, a score of 0 to 27 points may be given. Strawberries that fall into this classification shall not be graded above OFF-GRADE.

Absence of defects refers to the degree of freedom from strawberries damaged by discoloration or damaged by insect, mechanical, pathological or other injury; and from harmless extraneous vegetable material, such as, leaves, stems and caps. "Damage by discoloration" means any surface blemish having an aggregate area exceeding that of a circle ¼ in. in diameter or any noticeable blemish that extends into the fruit tissue.

To receive a rating of 34 to 40 points, the strawberries must be practically free from defects. There may be no harmless extraneous material present and not more than 5 percent by count of the whole strawberries or sliced strawberries may be damaged.

If the strawberries are fairly free from defects a score of 28 to 33 points may be given—not more than one piece of harmless extraneous vegetable material for each 16 oz. of net contents may be present and that not more than 10 percent by count of the whole strawberries or sliced strawberries may be damaged. Frozen strawberries that fall into this classification shall not be graded above U. S. GRADE B or U. S. CHOICE, regardless of the total score for the product.

If the defects are decidedly prominent so as to affect seriously the appearance of the product or if the frozen strawberries fail to meet the requirements of the paragraph above, a score of 0 to 27 points may be given. Frozen strawberries that fall into this classification shall not be graded above OFF-GRADE.

Character of fruit refers to the development, texture, and appearance as well

[1] Maerz and Paul's "Dictionary of Color."

DEHYDRATED

food products for Army, Navy and lend-lease use *must* be prepared under modern *sanitary* conditions!

Whatever vegetables, fruits, meat or other dehydrated food products you are now packing for Army, Navy, lend-lease or civilian use, make doubly sure of maintaining required high sanitary standards under which they must be prepared. But do this faster, easier, at lower cost, by using specialized, safe

OAKITE CLEANING
Materials . . . Methods

Note how THOROUGHLY and SPEEDILY clean-up work is performed . . . how much time and effort Oakite emulsifying and wetting-out action saves you by eliminating or reducing scouring and scrubbing! Note, too, that Oakite materials rinse away freely, leaving equipment surfaces in sanitary, film-free condition. And the exceedingly small amounts of material used make your cleaning dollar go further!

Do These 7 Jobs FASTER . . . EASIER!

Here, for example, are SEVEN different jobs which are now being successfully speeded-up, handled more easily and economically with Oakite materials and methods:

1. **Cleaning steam-jacketed cookers**
2. **Removing fruit stains from hoppers, pulpers, etc.**
3. **Washing stainless steel, galvanized, wire-mesh trays**
4. **Removing lime-scale deposits from blanchers**
5. **Cleaning sorting and inspection conveyor belts**
6. **Washing dehydrating room floors**
7. **Cleaning vegetable peelers**

The competent, personal service of our Nation-Wide Field Staff, the assistance of our Technical Laboratories, our 33 years' experience . . . ALL are freely available to help you find the RIGHT ANSWER to these and other cleaning or related problems. Write today!

OAKITE PRODUCTS INC., 26G THAMES STREET, NEW YORK

Representatives in All Principal Cities of the United States and Canada

as to the degree of disintegration of the strawberries. A strawberry that possesses a hard, seedy end in which not more than one-fourth of the strawberry is affected is considered well developed.

To receive a score of 17 to 20 points the strawberries must have a firm, fleshy texture. They must be well developed and practically intact with not more than 5 percent by count of whole strawberries that have hard, seedy ends or are noticeably disintegrated or flattened and with not more than 15 percent by weight of sliced strawberries that are noticeably disintegrated or flattened.

If the strawberries have a reasonably firm, fleshy texture, a score of 14 to 16 points may be given. They must be reasonably well developed and reasonably intact with not more than 15 percent by count of whole strawberries that have hard, seedy ends or are noticeably disintegrated or flattened and with not more than 25 percent by weight of sliced strawberries that are noticeably disintegrated or flattened. Strawberries that fall into this classification shall not be graded above U. S. GRADE B or U. S. CHOICE.

Frozen strawberries that fail to meet the requirements shall be given a score of 0 to 13 points and shall not be graded above OFF-GRADE.

The grade will be determined by averaging the score of all containers, provided not more than one-sixth of the containers fail in some respect to meet the requirements of the grade indicated by the average score. However, none of the containers may fall more than 4 points below the minimum score for the grade indicated by the average score.

ISSUED: July 31, 1942
EFFECTIVE: September 1, 1942

Dried Apples

DRIED APPLES are apples that have been peeled, cored and cut into segments and from which the greater portion of moisture has been removed. The fruit is sulphured sufficiently to retain a characteristic color. The finished product contains not more than 24 percent moisture by weight.

Rings are segments of apples that are obtained by slicing whole apples at right angles to the core. Quartered dried apples are segments of apples that are obtained by cutting whole apples longitudinally into three, four or six approximately equal units. Sliced dried apples are segments of apples that are obtained by cutting whole apples longitudinally into eight or more approximately equal units.

U. S. GRADE A or U. S. FANCY dried apples possess a bright, light yellow to white color. Not more than 20 percent by weight may be damaged by cores; not more than 10 percent by weight may be damaged by bad bruises, pieces of skin, bitter pit or other corky tissue, disease, worm holes, insect injury or other similar defects; and not more than 5 percent by weight of the pieces may be affected by mold, insect infestation, decay or other foreign material, or may be damaged by calyxes, stems or dirt, of which not more than one-tenth (or $\frac{1}{4}$ of one percent by weight of the total fruit) may be affected by decay. The total of all defects, except damage by cores, within the limits prescribed above, shall not exceed 10 percent by weight. In addition, the following requirements are applicable to the various styles:

Rings—Not less than 60 percent by weight shall be whole or practically whole rings and not more than 5 percent by weight may be so small as to pass readily through a $\frac{5}{8}$-in. square mesh screen.

Quartered—Not less than 95 percent by weight shall be whole or practically whole quarters and not more than 2 percent by weight may be so small as to pass readily through a $\frac{5}{8}$-in. square mesh screen.

Sliced—Not less than 80 percent by weight shall be whole or practically whole slices.

U. S. GRADE B or U. S. CHOICE dried apples possess a reasonably bright, yellow to white color. Not more than 30 percent by weight may be damaged by cores; not more than 15 percent by weight may be damaged by bad bruises, pieces of skin, bitter pit or other corky tissue, disease, worm holes, insect injury or other similar defects; and not more than 6 percent by weight of the pieces may be affected by mold, insect infestation, decay or other foreign material, or may be damaged by calyxes, stems or dirt, of which not more than one-twelfth (or $\frac{1}{2}$ of one percent by weight of the total fruit) may be affected by decay. The total of all defects, except damage by cores, within the limits prescribed above, shall not exceed 15 percent by weight. In addition, the following requirements are applicable to the various styles:

Rings—Not less than 50 percent by weight shall be whole or practically whole rings and not more than 5 percent by weight may be so small as to pass readily through a $\frac{5}{8}$-in. mesh screen.

Quartered—Not less than 90 percent by weight shall be whole or practically whole quarters and not more than 3 percent by weight may be so small as to pass readily through a $\frac{5}{8}$-in. square mesh screen.

Carload after carload of Viking Rotary Pumps are being shipped, packed for export and ready for service with our armed forces in every part of the world. Regular customers who are unable to get pumps at all . . . others who get them only after considerable delay . . . deserve a word of thanks for their patriotism and patience.

We're all doing the best we can. And there's one thing we're all agreed on. Equipment for our Fighting Yanks COMES FIRST . . . to speed Victory . . . so that our boys can get back home.

VIKING Pump COMPANY
CEDAR FALLS, IOWA

Sliced—Not less than 65 percent by weight shall be whole or practically whole slices.

U. S. GRADE C or U. S. STANDARD dried apples possess a fairly bright, yellow to white color. Not more than 40 percent by weight may be damaged by cores; not more than 20 percent by weight may be affected by pieces damaged by bad bruises, pieces of skin, bitter pit or other corky tissue, disease, worm holes, insect injury or other similar defects; and not more than 8 percent by weight of the pieces may be affected by mold, insect infestation, decay or other foreign material, or may be damaged by calyxes, stems or dirt, of which not more than one-sixteenth (or $\frac{1}{2}$ of one percent by weight of the total fruit) may be affected by decay. The total of all defects, except damage by cores, within the limits prescribed above, shall not exceed 20 percent by weight. In addition, the following requirements are applicable to the various styles:

Rings—Not less than 30 percent by weight shall be whole or practically whole rings and not more than 10 percent by weight may be so small as to pass readily through a $\frac{5}{8}$-in. square mesh screen.

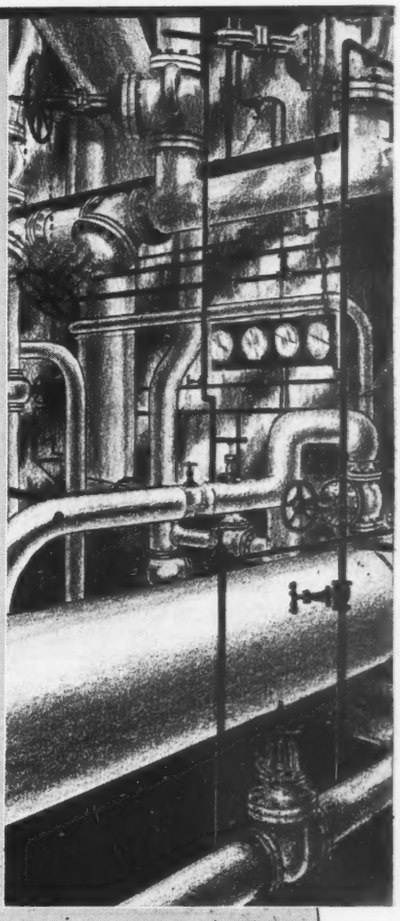
Quartered—Not less than 85 percent by weight shall be whole or practically whole quarters and not more than 4 percent by weight may be so small as to pass readily through a $\frac{5}{8}$-in. square mesh screen.

Sliced—Not less than 50 percent by weight shall be whole or practically whole slices.

OFF-GRADE dried apples are wholesome and edible dried apples that fail to meet the requirements of U. S. GRADE C or U. S. STANDARD.

A "practically whole ring" means that the ring may be cut or broken on one side but at least three-quarters of the ring is present. A "practically whole quarter" means that the quarter may be slightly cut or broken but at least three-quarters of the slice is present. A segment of dried apple is considered "damaged by cores" when it has pieces of carpel attached that cover an aggregate area exceeding the area of a circle $\frac{1}{2}$ in. in diameter. A "damaged" segment (other than by cores) of dried apple is one that is injured to the extent that its appearance, edibility or keeping quality is seriously affected by bad bruises, pieces of skin, presence of calyxes or stems, bitter pit or other corky tissue, dirt, disease, worm holes, insect injury or other defects. A segment affected by those defects, or any combination exceeding the maximum allowed for any one defect, is considered "damaged." "Bad bruises" are seriously discolored areas or are of such size and depth as to seriously detract from the

These are Times to DOUBLE-CHECK Your Valves



Proper care of valves begins with their purchase—meaning, that it pays in the end to buy good valves first.

But proper care doesn't end there . . . even the best valves need looking after, and prompt servicing, when necessary, will save more costly repairs and replacements later.

And these days, when it isn't easy to get new valves, and those you now have must do double and triple duty, it's just good business to do a little extra checking and inspecting of this vital equipment.

In the interest of uninterrupted production and the preserving of critical materials, Lunkenheimer urges every valve user to take extra special care of the valves he now has in service. They'll respond to good treatment and repay you in better service, less time out for repairs, and a minimum expenditure for maintenance.

Since virtually all materials used in the manufacture of valves are on the list of critical materials, valve users are urged to furnish the highest possible preference ratings and proper "end use" symbols on their orders. This will be of mutual helpfulness.

ESTABLISHED 1862

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LUNKENHEIMER VALVES

appearance. Slight, light brown bruises are not regarded as "damage." Segments are considered as "damaged" if they contain pieces of skin that are red in color and cover an aggregate area exceeding the area of a circle ¼ in. in diameter; or green or yellow in color and over an aggregate area exceeding the arch of a circle ½ in. in diameter.

ISSUED: August 27, 1942
EFFECTIVE: September 1, 1942.

Frozen Red Sour Pitted Cherries

(Tentative)

FROZEN RED SOUR PITTED CHERRIES are prepared from the properly matured fruit of the cherry tree of the red sour varieties; are properly washed, stemmed and pitted; are properly drained before filling; are packed with or without sugar or sirup; and are frozen and stored at temperatures necessary for the preservation of the product.

U. S. GRADE A or U. S. FANCY frozen red sour pitted cherries are cherries of similar varietal characteristics; have a practically uniform red color; are practically free from defects; have a firm, fleshy texture; possess a normal red sour cherry flavor; and score not less than 85 points when scored in accordance with the scoring system outlined herein. Not more than 5 percent by count may be less than 10/16 in. in diameter.

U. S. GRADE C or U. S. STANDARD frozen red sour pitted cherries are cherries of similar varietal characteristics; have a fairly uniform typical red color; are fairly free from defects; have a fairly firm, fleshy texture; possess a normal red sour cherry flavor; and score not less than 70 points when scored in accordance with the scoring system outlined herein.

OFF-GRADE frozen red sour pitted cherries are cherries that fail to meet the requirements for U. S. GRADE C or U. S. STANDARD.

The container shall be filled with red sour pitted cherries as full as practicable without impairment of quality.

Frozen red sour pitted cherries are usually packed with added sugar in a definite ratio and such packs are termed 2+1, 3+1, 4+1, and 5+1 pack. "5+1 pack" means that at the time of packing, one pound of sugar is added to five pounds of cherries. Inspection certificates will indicate the ratio of sugar when the amount of sugar used can be determined at the time of packing. If red sour cherries are packed with sirup as a packing medium, the density of the sirup at the time of packing will be indicated on the inspection certificate when it can be determined. The grade of frozen red sour pitted cherries is determined after complete thawing under a gentle spray of tap water at a temperature of approximately 68 deg. F. or at the time of packing before freezing.

Cherries that possess a practically uniform typical red color may be given a score of 17 to 20 points. "Practically uniform typical red color" means that not more than 15 percent by count of cherries may vary from the typical red color of fully matured red sour cherries.

If the cherries have a fairly uniform typical red color, a score of 14 to 16 points may be given. "Fairly uniform typical red color" means that not more than 25 percent by count of cherries may vary from the typical red color of fully matured red sour cherries. Frozen red sour pitted cherries that fall into this classification shall not be graded above U. S. GRADE C or U. S. STANDARD.

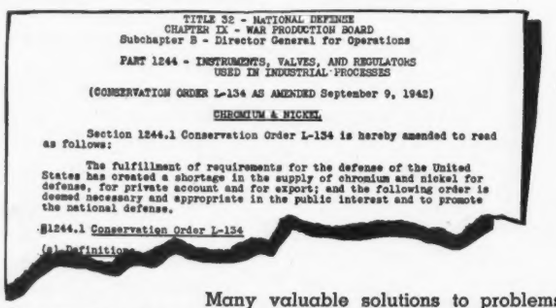
If the cherries have a poor color or are off color for any reason, a score of 0 to 13 points may be given. Frozen red sour pitted cherries that fall into this classification shall not be graded above OFF-GRADE, regardless of the total score for the product.

The factor of absence of defects has reference to the degree of freedom from cherries blemished with scar tissue, scab, discoloration, hail injury, limb rubs, spray scald, bird or insect injuries, mutilated or pitter-torn cherries, or other abnormalities, pits and harmless extraneous material (such as stems and leaf tissue). "Minor defects" are surface blemishes that discolor the skin but do not extend into the fruit tissue. A cherry showing surface discoloration having an aggregate area not exceeding that of a circle $\frac{3}{16}$ in. in diameter and not extending into the fruit tissue is not considered a defective cherry. "Major defects" consist of blemishes that extend into the fruit tissue, bird or insect injuries, and mutilated or pitter-torn cherries. A mutilated or pitter-torn cherry is one that is split open so that the entire pit cavity is exposed.

If the cherries are practically fre from defects, a score of 34 to 40 point may be given. "Practically free from defects" means that there is present no extraneous material, not more than one pit for each 20 ounces of net contents, not more than 10 percent by count of cherries affected by "minor defects," and not more than 4 percent affected by "major defects." The total of all defective cherries shall not exceed 10 percent by count.

If the cherries are fairly free from defects, a score of 28 to 33 points may be given. "Fairly free from defects" means that there is present not more

How to CONSERVE
ESSENTIAL INSTRUMENT MATERIALS
in compliance with
WPB *Conservation Order* No. L-134


TITLE 32 - NATIONAL DEFENSE
CHAPTER IX - WAR PRODUCTION BOARD
Subchapter B - Director General for Operations

PART 1244 - INSTRUMENTS, VALVES, AND REGULATORS USED IN INDUSTRIAL PROCESSES

(CONSERVATION ORDER L-134 AS AMENDED September 9, 1942)

CHROMIUM & NICKEL

Section 1244.1 Conservation Order L-134 is hereby amended to read as follows:

The fulfillment of requirements for the defense of the United States has created a shortage in the supply of chromium and nickel for defense, for private account and for export; and the following order is deemed necessary and appropriate in the public interest and to promote the national defense.

§1244.1 Conservation Order L-134

(a) Definitions

Many valuable solutions to problems arising from the new WPB Conservation Order L-134, which drastically limits the use of various materials for thermocouples, lead wire, thermometer bulbs, protecting tubes, etc., are given in the recently published Wheelco Supplement to Thermocouple Bulletin S2-3. The Supplement S2-3 is the result of an extensive analysis of the WPB Order L-134 by Wheelco Engineers and is published for the benefit of those who will be affected by this order. The Supplement also contains a partial summary of the L-134 Order; the complete L-134 Order as amended September 9, 1942, additions and revisions applying to various items in the Wheelco S2-3 Bulletin and a complete list of Wheelco Sales and Service Engineers who can help you with your instrument problems.

Write for your FREE copy of Supplement to Bulletin S2-3 and the issue of Wheelco Comments which deals with Thermocouple construction and maintenance. Also request copy of Bulletin S2-3 if you do not have a copy.

Wheelco Instruments Co.
823 W. HARRISON STREET • • • CHICAGO, ILLINOIS

Originator of "Electronic Principle" Temperature Controls

than 15 percent by count of defective cherries, not more than one piece of extraneous material (such as a stem or a leaf), and not more than one pit for each 20 oz. of net contents. Frozen red sour pitted cherries that fall into this classification shall not be graded above U. S. GRADE C or U. S. STANDARD, regardless of the total score for the product.

If the cherries fail to meet the requirements of the paragraph above, a score of 0 to 27 points may be given. Frozen red sour pitted cherries that fall into this classification shall not be graded above OFF-GRADE, regardless of the total score for the product. Frozen red sour pitted cherries that fail to meet the tolerance for pits shall be certified with the additional statement "Partially Pitted Cherries."

To receive a rating of 34 to 40 points the cherries shall have a firm, fleshy texture, typical of full-fleshed ripe fruit.

If the cherries are slightly lacking in firmness and are thin-fleshed, a score of 28 to 33 points may be given. Frozen red sour pitted cherries that fall into this classification shall not be graded above U. S. GRADE C or U. S. STANDARD, regardless of the total score for the product.

If the cherries are soft or tough, a score of 0 to 27 points may be given. Frozen red sour pitted cherries that fall into this classification shall not be graded above OFF-GRADE, regardless of the total score for the product.

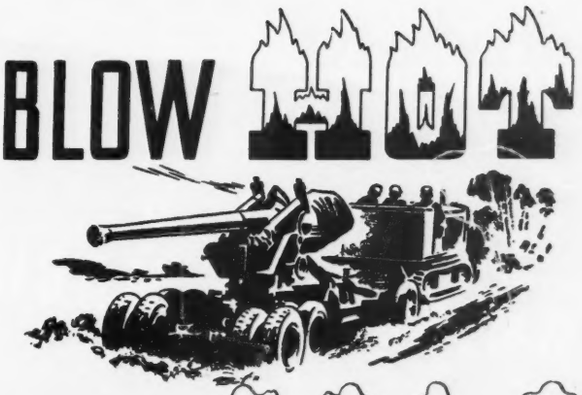
"Diameter" of a cherry means the greatest dimension measured through the center at right angles to a line running from the stem end to the blossom end. "Normal flavor" means that the product is free from objectionable or off-flavors of all kinds. "Pitted" means that all pits have been removed from the fruit with a tolerance provided of not to exceed one pit in each 20 oz. of net contents, based on a total quantity of contents of at least 24 lb. Count fragments of pits as follows

1. Found loose in packing medium. —If a piece is equal to or smaller than one-half pit, count as one-half pit; or if a piece is larger than one-half pit, count as one pit.

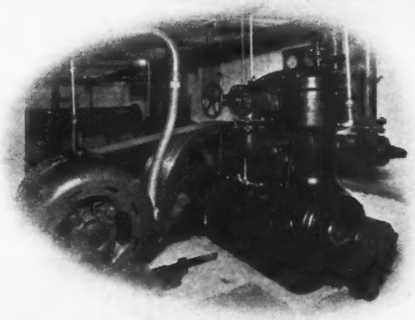
2. Two or more pieces imbedded in or attached to the flesh of the cherry.— If their combined size is equivalent to one-half pit or less, count as one-half pit; or if their combined size is equivalent to more than one-half pit, count as one pit.

When certifying samples which have been officially drawn and which represent a specific lot of frozen red sour pitted cherries, the grade will be determined by averaging the score of all containers.

ISSUED: July 6, 1942
EFFECTIVE: July 15, 1942



BLOW COLD



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Blazing big Guns that carry the promise of destruction to enemy hordes.... Compact, efficient Refrigeration and Air Conditioning Equipment for Army food preservation and Industrial production problems. . . . All have a common "parent" in the well-known knowledge, skill, and experience long developed at Vilter.

Born in the precision-engineering craftsmanship of determined men, produced at record-breaking speed by Vilter's plant facilities, these "battle-line" products are meeting stiff production schedules so vital to our Nation's war effort. . . . A supreme effort of men and machines to back up our men on fighting fronts.

We're justifiably proud of the Army-Navy "E" Flag that flies from our masthead—recognition of this effort. It's a symbol of the determination of free men to meet every challenge to liberty, an incentive to better work, faster production.

Consecrated as we are to the "Tools of Victory," we maintain our responsibility for America's Food protection. Call on Vilter Engineers for aid in keeping your refrigeration Equipment in efficient operating condition for the duration.

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★ ★ Superior Since 1867 VILTER Air Conditioning Refrigeration .. ★ ★

The MODEL D COMMINUTING MACHINE for DEHYDRATION

PREPARATION for DRYING

SPRAY • ROLLER • TUNNEL • CABINET

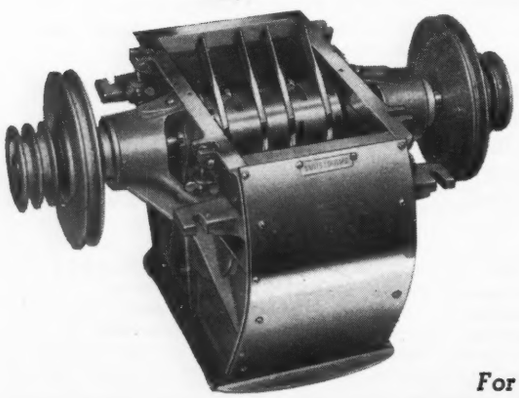
Smooth Purees to Chopped Pieces

FINISHING for PACKAGING

All types of dehydrated vegetables and fruits pulverized to desired particle sizes for uniform packaging.

PERFECT SANITATION

The Model D Comminuting Machine is constructed of stainless steel and approved type of corrosion-resistant metals. Outboard bearing housings prevent any possible grease contamination. All parts coming in contact with foods processed can be disassembled, without tools, in about one minute. The parts can be completely immersed in water, cleaned with live steam or by any other desired method.



The Reversible Comminuting Chamber, with Outboard Bearing Housings is exclusive with the Model D Comminuting Machine. This feature permits the use of knife blades for chopped pieces and impact blades for puree or pulverizing of dehydrated foods. Change of operating positions requires about one minute without use of tools.

Production capacity up to 3000 pounds per hour.

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THE W. J. FITZPATRICK COMPANY

Telephone Chesapeake 2800

1001 WASHINGTON BOULEVARD • CHICAGO

PATENTS

Sterile, Naturally Flavored and Colored Juice Obtained From Watermelons—Ernest Stanley Yawger, Jr., to Crown Can Co., Philadelphia, Pa. No. 2,298,328. Oct. 13, 1942.

Canned Milk and Like Given End-over-end Movement During Passage Through Zone of Processing Heat Treatment—Harry L. Griffin, Rockville Centre, and Alexander R. Robb, Valley Stream, N. Y., and Rolla W. Titus and Hans T. Gebhardt, Marysville, Ohio, to Nestle's Milk Products, Inc., New York, N. Y. No. 2,298,693. Oct. 13, 1942.

Potatoes and Like Peeled in Machine Having Removable Horizontal Peeling Means to Facilitate Cleaning Operations and Airing—Jefferson L. Jones, Brookline, Mass. No. 2,299,020. Oct. 13, 1942.

Foodstuffs Heat Treated in Continuous Manner With Addition of Predetermined Amount of Treating Liquid During Passage Through Heat-treating Chamber—William de Back, to Chisholm-Ryder Co., Inc., Niagara Falls, N. Y. No. 2,299,080. Oct. 20, 1942.

Foods Heat Treated by Electric Conductance—Enoch L. Griffith, to Griffith Laboratories, Inc., Chicago, Ill. No. 2,299,088. Oct. 20, 1942.

Vegetables Diced by Being Forced Under Screw Shaft Action Through Cutting Grill Across Path of Travel of Cutting Blade—Theodore R. Johnson, Menasha, Wis. No. 2,299,092. Oct. 20, 1942.

Pimentoes Cored and Cleaned by Mechanical Means—Robert P. Gesen and Earl R. Vick, to Old Mission Packing Corp., Ltd., San Diego, Calif. No. 2,299,137. Oct. 20, 1942.

Non-sticky, Free-flowing Sugar Mixture for Fondant Making Made to Consist of About 70 Percent Crystallizable and About 30 Percent Noncrystallizable Portions—Robert Whymper, New York, N. Y., to National Sugar Refining Co., Edgewater, N. J. No. 2,299,287. Oct. 20, 1942.

Free-flowing and Noncaking Sprinkling Sugar Made by Covering Crystals With Noncrystallizable Sticky Film and Finally With Crystalline Nonhygroscopic Fine Sugar—Robert Whymper, New York, N. Y., to National Sugar Refining Co., Edgewater, N. J. No. 2,299,288. Oct. 20, 1942.

Oysters Punched by Mechanical Means Preparatory to Shucking—Leary Dickerson, Nesting, Va. No. 2,299,311. Oct. 20, 1942.

Patties Automatically Formed, Deposited Upon Bottom Paper Strip and Cut Into Individual Units—Joseph Elesh and Julius F. Kopsa, Chicago, Ill., and Herbert W. Anderson, Chesterton, Ind., to Joseph Elesh, Chicago, Ill. No. 2,299,314. Oct. 20, 1942.

Sugar Treated Through Mechanical Mingling, Mixing and Centrifuging Zone Under Controlled Temperature Conditions—Jacob J. Neuman, South Salem, N. Y., to U. S. Patent Development and Royalty Co., South Salem, N. Y. No. 2,299,422. Oct. 20, 1942.

Juice Extracted From Fruits and Vegetables in Open Atmosphere Preliminary to Passage Through Closed Chamber Countercurrent to Inert Gas and to Screening for Removal of Seeds—Ronald B. McKinnis, to Sunshine Foods, Inc., Winter Haven, Fla. No. 2,299,553. Oct. 20, 1942.

Prunes Processed in Continuous Manner—Charles O. Smith, San Jose, Calif. No. 2,299,658. Oct. 20, 1942.

Vegetable Phosphatides Dissolved in Fatty Material Given Improved Properties by Treatment With Oil-soluble Aliphatic Peroxides and Oil-soluble Aliphatic Per-Acids—Albert K. Epstein, Chicago, No. 2,299,743. Oct. 27, 1942.

Sugar Solutions Containing Alkaline Earth Metal Salts Treated With From 2 to 10 P.p.m. of Molecularly Dehydrated Alkali Metal Phosphate to Inhibit Formation of Scale During Evaporation—Marshall R. Allen, Findlay, Ohio. No. 2,299,783. Oct. 27, 1942.

Cheese Protected Against Surface Deterioration by Dipping in Wax Consisting of About 50 Percent Crystalline Petroleum Wax, From About 5 to 15 Percent of Rubber Resin, and From 35 to 45 Percent High-melting Amorphous Petroleum Wax—James D. Ingle, to Industrial Patents Corp., Chicago, Ill. No. 2,299,951. Oct. 27, 1942.

Egg Whites Beaten Into Foam and Treated With From 0.3 to 0.5 Percent Hydrochloric Acid for Formation of Strands Preliminary to Drying at From 110 to 135 Deg. F.—Leon D. Mink, to Industrial Patents Corp., Chicago, Ill. No. 2,299,953. Oct. 27, 1942.

Poultry Plucked by Mechanical Means, Using Rotatable Drum With Plurality of Flexible Studs Projecting Outwardly—George R. Hunt, Akron, Ohio. No. 2,300,157. Oct. 27, 1942.

Cream Churned to Butter Under Vacuum—Robert D. Pike, Piedmont, Calif., to A. W. Stitt, San Francisco, Calif. No. 2,300,171. Oct. 27, 1942.

Peaches Stoned by Manually Operated Mechanical Means—Sarah Caroline Farmer, Eugene, Ore., one-half to Lydia May Clark, Modesto, Calif. No. 2,300,212. Oct. 27, 1942.

Sugars in Acid Solution Electrolytically Reduced to Form Sorbitol—Ralph A. Hales, Tamaqua, Pa., to Atlas Powder Co., Wilmington, Del. No. 2,300,218. Oct. 27, 1942.

Peas and Like Frozen in Continuous Manner During Passage Through Compartment Equipped With Feeder Tray and Agitating and Conveying Mechanism to Assure Uniform Exposure to Counter Blast of Low-temperature Air—Frank W. Knowles, Seattle, Wash. No. 2,300,229. Oct. 27, 1942.

Citrus Fruits Peeled by Mechanical Means—Ralph Polk, Sr., Miami, Fla., to Polk Development Co., Tampa, Fla. No. 2,300,312. Oct. 27, 1942.

Candy Bars Rolled in Nuts and Shaped in Continuous Manner by Mechanical Means—Charles E. Bookidis, Davenport, Iowa. No. 2,300,396. Nov. 3, 1942.

Casein as Alkali Metal Caseinate Used to Form Stable, Homogenized, Heat-sterilized, Water Emulsion of Oil-soluble Vitamin—Charles G. Ferrari, Minneapolis, Minn., to General Mills, Inc. No. 2,300,410. Nov. 3, 1942.

Juice Extracted From Citrus Fruits by Cone-shaped Reaming Burr With Fluted Exterior Surface and Slot Extending Across Diameter—Alexander P. Fothergill, Orlando, Fla., to Fogar, Inc. No. 2,300,494. Nov. 3, 1942.

Pectin Extracted by Addition of Soluble Metal Compound Purified by Leaching With Acidified Alcohol Preparatory to Drying—Gordon Manley Cole and Homer H. Holton, Corona, Calif., to California Fruit Growers Exchange, Los Angeles, Calif. No. 2,300,651. Nov. 3, 1942.

Seaming Flange of Packed Open Cans Mechanically Cleaned Before Sealing—Clyde D. Russell, Oakland, Calif., to California Packing Corp., San Francisco, Calif. No. 2,300,704. Nov. 3, 1942.

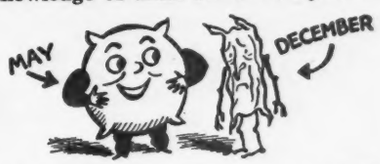
Fruit Automatically Positioned and Rotated Against Tipping Knives Preliminary to Further Treatment—Ellsworth W. Carroll, San Carlos, Calif., to S. & W. Fine Foods, Inc., San Francisco, Calif. No. 2,300,773. Nov. 3, 1942.

Correction

As the result of a typographical error, an incorrect number was published for the patent, "Whey Fermented by Acetone Butyl Alcohol Bacteria for the Production of Vitamin B_2," in the Patents department of the November, 1942, issue of "Food Industries," on page 98. The correct number is 2,297,671. —The Editors.

"Whad'ya Know, Brother, About BULK?"

EVERY TECHNICAL man is supposed to know his own field thoroughly and have a general idea of related technical fields. But few food processors have time to develop more than a sketchy knowledge of these related subjects.



Take the bulkiness of salt—the specific gravity—which may vary rather widely. A survey of various salt products from different sections of the country has shown that even salt of the same grade can vary up to 25% in bulkiness over a period of months.

Diamond Crystal processing engineers have eliminated this variation to a considerable extent through rigid control of crystallizing conditions and the most modern screening methods. Thus the various grades of Diamond Crystal Salt will not vary more than 4% plus or minus—usually not over 2%.

If you, as a food processor, are applying salt by volume—through a hopper, for example, as is the case in salting soda crackers, potato chips, and any number of similar applications—then you can only achieve flavor control by using a salt that varies but slightly in bulkiness. Why not check the density of the salt you are using as each shipment is received and see how much it varies in bulk? If you find that this is the solution to that variable-flavor problem, get in touch with our Director of Technical Service. He will be glad to help you find a cure. Diamond Crystal Salt Co., Inc., St. Clair, Michigan.

DIAMOND CRYSTAL
ALBERGER PROCESS SALT

PROTECTED *by* CROWN

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THAT familiar phrase "Protected by Crown" takes on a new meaning!

For Crown has furnished and is supplying millions of canisters to hold the filter elements of gas masks for military, naval and civilian use.

"Protected by Crown" never meant more than it does in this case... a grim thing to think about... but an important part of the big wartime job that the Crown Can organization is doing!

Crown engineers designed and built much of the special machinery required to make these canisters... and brought to that task the skill and experience acquired in the production of Crown Cans for more ordinary... and more peaceful purposes.

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CROWN CAN COMPANY, PHILADELPHIA, PA.
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CROWN CAN

FOOD TECHNOLOGY

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CANNING

Conserving Vitamin C In Canning Chicken

MEASUREMENT of vitamin C may serve as an index of quality in canning, even for foods in which ascorbic acid content is relatively low, since this vitamin is most unstable to oxidation, particularly when catalyzed by heat or the presence of such metals as copper.

In processing canned poultry there are three heat treatments, precooking, exhausting residual air and retorting the sealed cans. Of these the precooking is most readily improved. Tests showed a distinct increase in the vitamin C content of the product when pressure kettles were substituted for steam-jacketed open kettles. The pressure kettles permit rapid precooking with conservation of flavor and food value. Taste panels definitely showed consumer preference for the pressure-precooked product, even in packs showing no appreciable difference in chemical analysis for protein, fat, carbohydrates and minerals.

The canned poultry showed a higher vitamin content per unit than the raw muscle meat. A considerable portion of this vitamin contribution comes from the broth prepared in precooking the whole drawn birds.

Vitamin determinations were made on canned products after ten months' storage. Commercial packs averaged from 3 to 4.5 mg. total ascorbic acid per 7-oz. can. Special commercial packs, varying only in precooking, gave an average of 6.6 for open-kettle and 10.9 for pressure-kettle precooking.

Digest from "The Vitamin C (Ascorbic Acid) Content of Canned Chicken," by E. J. Redman, L. Buckby and R. T. Legault, *Canadian Journal of Research*, vol. 20D, 230-34, 1942; National Research Council of Canada, No. 1057 (Published in Canada).

Survey of Canned Salmon

SINCE the last comprehensive survey of canned Chinook and Alaska salmon, nearly 20 years ago, mechanical vacuum has replaced steam exhaust and there have been other changes of procedure which might possibly influence the bacteriological status of the product.

Organoleptic examination of 108 cans representing 13 canneries showed all samples to be normal in appearance, flavor and odor. No pH values were outside the range considered to be normal. Plate culture tests showed some colonies of aerobic sporeformers, some pigmented and nonpigmented cocci and some molds, but no colonies which could not be explained as arising from airborne contamination. Complete proof of absolute sterility would require a program of cultural tests with multiple controls, but the evidence obtained in this survey demonstrates that for practical purposes all the test cans were bacteriologically sterile.

Digest from "Bacteriological Survey of Canned Salmon," by O. B. Williams and E. D. Clark, *Food Research*, vol. 7, 178-85, 1942.

BAKING

Stability of Added Vitamin A in Baking

FOUR types of baked goods—bread, biscuits, white pound cake and pie crust—were prepared from fats fortified with vitamin A. Assays were made by the Carr-Price color reaction, checked by U.S.P. bio-assays.

From 80 to 100 percent of the vitamin survived the baking process in bread, biscuits and cake. Pie crust undergoes a more severe baking and in this the loss of vitamin was larger. In the pie crust, but not in the other products, the destruction of the vitamin was dependent on the baking time.

Digest from "Vitamin A Added to Fats as Related to Stability During Baking," by E. E. Rice, H. C. Black, G. T. Carlin and H. E. Robinson, *Oil & Soap*, vol. 19, 164-65, September, 1942.

DAIRY PRODUCTS

Bacteria in Ripening Of Brick Cheese

STARTER bacteria, *streptococcus lactis* and *thermophilus*, function to ferment the lactose and develop acidity rapidly. Where the pH does not fall below 5.3 in the first three days, anaerobic sporeformers are liable to cause gas formation, as in washed-curd cheese made from pasteurized milk. *Str. lactis* persists throughout ripening but *thermophilus* dies off after the first week or two. In raw milk cheese *lactobaccilli* appear after a week or two. *L. casei* is most frequent and is necessary for normal ripening, both for body and flavor. Other *streptococci* appear at times in significant numbers. *Str. fecalis* probably helps in flavor development but *str. liquifaciens* at times causes bitter flavor.

Digest from "The Bacteriology of Brick Cheese, III. The Bacteria Involved in Ripening," by E. M. Foster, J. C. Garey, and W. C. Frazier, *Journal of Dairy Science*, Vol. 25, 323-33, April 1942.

MEAT

Recent Patents

AMONG patents of interest to packers is one to Ramsbottom covering the use of an edible oil saturated with carbon dioxide to prevent surface deterioration and dehydration during aging of beef. The cuts can be trimmed before aging, so that the trimmings are usable in other products. Beef cuts are immersed in the carbonated oil, the container is closed so as to protect the oil from air and prevent absorption of oxygen or loss of carbon dioxide, and the container and contents are held at 33 to 40 deg. F. for a period of from 3 to 4 weeks. Steaks and other choice cuts can then be used from the container.

The Plitts have obtained a patent covering production of tender and uniform cuts of meat by deep freezing in a mold under pressures of 50 to 250 lb. per square inch for 40 to 50 hours at about 15 deg. F., then thawing gradually, slicing and piling the slices in such a way that the grain of one slice is at an angle to that of the one below. A moderate pressure will cause the slices to adhere. The patentees state that the pressure, particularly when combined with freezing, causes cell rupture and a release of juice which is then held in place by the quick freezing. The process is applicable both to muscle tissue and to low-fiber meats of glandular or organic origin, such as sweetbreads.

Jensen and Paddock produce sterile canned meats with good keeping qualities by an intermittent heating process. They have found that the bacteria causing gas formation, aerobic spore-bearing rods, are resistant to heat up to temperatures above those usual in sterilizing canned meats, but that they can be destroyed by a short exposure to such temperatures if the spores are

permitted to germinate. The improved treatment consists in heating the canned meat at 140 to 212 deg. F. for ½ hour to 3 hours, cooling to about 48 deg. F. and maintaining that temperature for 15 to 24 hours. From two to four cycles are required for complete sterilization.

Digest from U. S. patents 2,290,493, issued July 21, 1942, to J. M. Ramsbottom and assigned to Industrial Patents Corp., Chicago; 2,298,159, issued October 6, 1942, to K. G., K. G. Jr. and E. A. Plitt, St. Louis, Mo.; and 2,297,962, issued October 6, 1942, to L. B. Jensen and L. S. Paddock, also assigned to Industrial Patents Corp.

Determination of Soybean Flour in Meats

SAUSAGE and other meat food products, in addition to the salts of the picking brine, may contain cereals, starch, milk powder and eggs, so that the determination of any one ingredient is a very complex problem. Yet the regulations provide that cereal, starch, flour and milk powder shall not exceed 3.5 percent in sausages, and in other cases it is necessary to know whether more or less than 5 percent has been added, as this affects labeling.

A gravimetric procedure has been worked out for determining soybean flour, based on the presence of glycinin, which is the characteristic soybean flour protein. Glycinin can be separated from the albumin and animal proteins because it does not coagulate by heat from a water solution. It can be separated from other vegetable proteins by a series of operations involving solvent extractions and salting-out procedures. Milk solids cause some difficulty but the results can be correlated for known amounts. Interference encountered from the presence of liver has now been overcome.

The final precipitate is weighed as a copper proteinate.

The method is time-consuming but it is very simple and requires no special apparatus. It is presented in a step by step manner, with full discussion of the manipulative procedure and the reasons for each step. All the conditions are standardized.

Digest from "Determination of Soybean Flour in Sausages and Other Meat Products," by John Bailey, *Industrial and Engineering Chemistry, Analytical Edition*, vol. 14, 776-81, October, 1942.

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CONFECTIONERY

Apple Confections

A METHOD has been developed for making a nonsticky, moldable confection by mixing milk with apple juice or pulp and drying at a moderate temperature under vacuum. There is a high measure of flexibility in the process.

The apple juice may be freshly pressed, clarified or concentrated. Apple cider can also be used. The milk may be whole or skimmed, fresh, condensed or dried. And any of these ingredients may be used sweetened or unsweetened. Processing is carried out at a temperature of 100 to 208 deg. F. and at reduced pressures between 3 and 28 in. of mercury. Proportions of the ingredients range from 2 parts apple juice and 6 parts milk to 3 parts juice with 5 parts milk.

Digest from U. S. Patent 2,295,020, issued September 8, 1942, to F. C. Vilbrandt, R. D. Sieg and T. F. Farrar.

FATS AND OILS

Shortening the Time For Stability Testing

THE test now in use, which determines antioxidative properties of fats and oils by aeration at 97.7 deg. C. in order to accelerate development of rancidity to certain predetermined peroxide levels, has been examined with a view to obtaining results within a much shorter period of time. An entirely new test was not desired because it is necessary that the results of the quicker test can be correlated with existing data.

Metal catalysts, including copper stearate, accelerated the reaction but did not give consistent or reproducible results.

An increase in the test temperature to 110 deg. C. was found to give satisfactory correlation and a 60 percent reduction in the time required for testing. The authors report test results on 47 samples comprising "just about every type of fat or oil commonly used or encountered."

The ratio of the time required on the old to the new basis is 2.5:1.

Close temperature control of the incubation bath is essential, since a variation of even 1 deg. C. will change the results appreciably. Greater accuracy could probably be obtained if there were some continuous indicator method to tell when a definite peroxide level is reached. The interval between samplings may introduce a variation in results.

Digest from "A Study of Methods of Accelerating the Swift Stability Test," by V. C. Mehlenbacher, *Oil and Soap*, vol. 19, 137-39, August, 1942.

QUALITY CONTROL

Grape Oxidase Activity

THE darkening during drying which causes Thompson seedless grapes to yield dark raisins is largely due to grape oxidase. The usual commercial dip solutions decrease oxidase activity if sufficient immersion time is allowed, but the very short soda, mixed, or hot water dips sometimes used stimulate oxidase activity in these grapes.

Sulphuring inhibits grape oxidase approximately in proportion to the concentration of the sulphur dioxide during sulphuring and the time of exposure.

Dehydrated raisins have only about one-fifth the oxidase activity observed in shade-dried raisins, probably because of higher drying temperature.

Digest from "Effect of Pretreatment and Subsequent Drying on the Activity of Grape Oxidase," by A. A. Hussein, E. M. Mrak and M. V. Cruess, *Hilgardia*, vol. 14, 349-57, 1942.

Catalase Determination

IN food processing plants, catalase tests must be made in a minimum period of time. In Canada, for instance, the government requires that all vegetables intended for dehydration be tested after blanching, as a quality control for the dehydrated products.

A method which will give accurate results in 2 minutes has been worked out by modifying the Tressler procedure. The modified method gives only relative values, but is suitable for comparisons.

Oxygen liberated from the reaction of catalase and hydrogen peroxide is measured by a manometer which is substituted for Tressler's fermentation tube. Catalase may be reported as milliliters of oxygen liberated from 0.1 gram in 2 minutes or may be calculated by the method of Tressler and Evers.

Digest from "Simplified Apparatus for Catalase Determination," by R. R. Thompson, *Industrial and Engineering Chemistry, Analytical Edition*, vol. 14, p. 585, July, 1942.

ENGINEERING

Prefreezing

FREEZER rooms designed for bulk storage of frozen foods cannot provide for satisfactory freezing of such foods during harvest periods when a very large quantity must be placed in storage during a short time. If storage rooms are fully loaded very unsatisfactory heat transfer conditions are established and spoilage losses are large, equipment operates inefficiently under abnormal loads, and handling costs are increased. If the rate of acceptance of produce to be stored is reduced to the amount that can be kept in good condition, there are large losses in revenue from unfilled storage space.

Preliminary quick freezing in a multistage unit eliminates spoilage, improves quality of stored food, and permits economical operation of storage rooms.

Data are submitted on the operation of a typical cold storage plant during the 10- to 12-day cherry packing season. When a quick freezing unit was installed adjacent to the receiving platform it was found that prefreezing permitted the storage rooms to be filled to capacity and arranged for permanent storage without rehandling, increased the refrigerating capacity of the compressors 34 percent and reduced the power input per ton of frozen food over 16 percent, and prevented fluctuations in temperatures. An even storage temperature prevents desiccation of the food being placed in storage or of other foods already in storage. Prefreezing in this way eliminated spoilage losses.

Prefreezing cannot be accomplished satisfactorily in an air-blast sharp freezer of conventional design.

Experience has shown that in most instances a comparatively simple and inexpensive rearrangement of existing equipment will fulfill the requirements peculiar to any plant. In addition to the economies effected in handling and storage, the improvement in food quality is significant.

Digest from "Economic Aspects of Prefreezing Bulk Foods Before Storage," by W. J. Finnegan, *Refrigerating Engineering*, vol. 44, 225-29, October, 1942.

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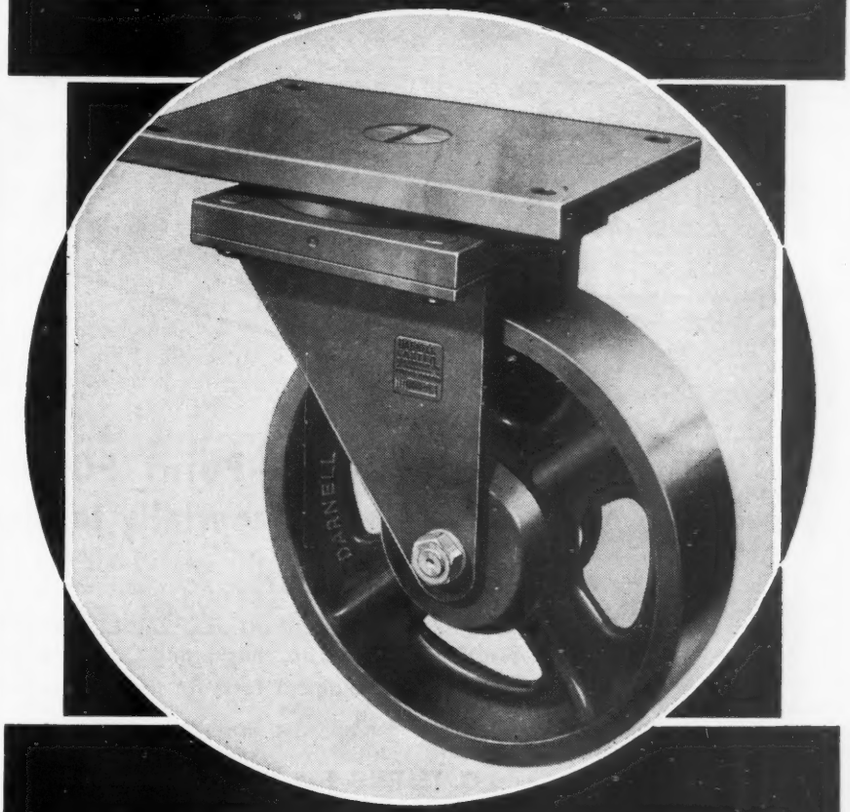

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War Forces Progress In Food Processing

(*Continued from page 39*)

Wartime use is being made of an invert sugar sirup with 55 percent of dextrose and maltrose which has a comparative sweetening power of about 40, and of solid dextrose as a substitute for as much as a quarter of the sucrose in canning. Sweetening of canned fruits is also effected with the use of saccharin, dulcin (*p*-phenetylcarbamide) in small proportion, and by altering the pH with alkaline buffers and the total acidity with sodium hydroxide.

Ordinary garden parsley has been found a rich source of vitamin G; so has the potato.

The loss of Malay has changed food canning methods. Glass is being substituted for cans for fruit, as it has been found that fruit is sufficiently acid to obviate the necessity for sterilizing temperatures in excess of 190 deg. F. Even the heat-resisting spores of *Byssochlamus fulva* are killed with certainty at this point. The solder being used by the canning industry is a lead base alloy with only 5 percent tin. It has a melting point of 540 deg. F., against 446 for prewar solder, and a lower alloying power.

Britain has also turned to refrigeration on a larger scale than ever in its history, in order to lay up food reserves.

The factories are also being changed, now that night work shifts are regular. A new method of air conditioning by humidifying the air with water vapor so that droplets do not fall on machinery or material has been devised to give to the atmosphere any moisture required for the food processing or the workers' health. Light-ray methods for controlling mechanical operations, automatically switching lights on and off in dusk or dawn, in fog or storm, are being used increasingly to control factory lighting. Special colors which change through a graduated series of shades with temperature changes are now being painted on practically any surface, machine or room, or on heated surfaces, to give rapid temperature readings. By change of color they indicate at a glance when temperature drops occur or if excessive heating is taking place.

Developments in Russia

Soviet food technicians have developed new methods for conserving vitamin C in soups for workers' canteens that are isolated from the big towns, particularly on farms. The Ukrainian vitamin C soup borsch, made by the Russians from a number of vegetables cooked together to provide essential food for workmen on their famous collective farms, has high calorific and vitamin values. It has been found that the best way to preserve these food values is to convey the soup to the farm workers in properly closed containers, or vacuum containers, so that it does not have to be reheated.

Foods of the butter type—emulsions of milk, fat and water which have a better taste and constitution than ordinary margarine and are more economical to produce—are now being made. A colloid mill has been devised for the synthetic production of these butter-like products. It was found that if the colloidal solution left the mill at a temperature higher than the fat, butter did not form. The emulsion must be cooled to about 5 deg. C. (41 deg. F.), and the longer the emulsion is left at low temperatures the lower is the percentage of fat in the buttermilk. Butter cannot be prepared this way if the fat dispersion in the emulsion is more than 45 to 55 percent, and 40 percent fat for 60 percent milk was used in many experiments that were successful. Further economies were effected by diluting the milk and water. The milk of an emulsion can be collected from the buttermilk and reused two or three times for the preparation of new emulsions.

There Are Two Parts To a Fire-Bomb Blaze

(*Continued from page 59*)

liquid without starting a fire. But should the liquid be of lesser depth, the sparks shot out during the thermite reaction, which will take place when the bomb strikes bottom, may fly out of the liquid and may ignite the surface vapors. The result, however, will be an ordinary flammable-liquid fire which may be fought with any type of fire extinguisher approved for that class of fire.

When live electrical equipment is involved in a bomb-fire, the current should, of course, be cut off immediately. The bomb-fire then becomes either an insulation fire or an oil fire, and, according to circumstances, should be fought by one of the methods previously described.

If the current cannot be cut off but the bomb can be dislodged, any fire in the live equipment can be safely extinguished with vaporizing-liquid or carbon-dioxide extinguishers. Should it be impossible to dislodge the bomb, the outlying fire can be kept in check with the same weapons, while the bomb burns itself out.

In some cases, a bomb in live electrical equipment can be put out with a magnesium-extinguishing preparation, but it must be borne in mind that some of these compounds are electrical conductors and should not be used where they may make matters worse by causing short circuits.

As a matter of fact, most of the incendiaries that might be dropped on a food plant of modern construction would land where they can be readily disposed of before they could do material damage. But should a bomb fall on a wooden roof or in the midst of a large quantity of combustible materials, the resulting fire might be extremely dangerous. Every food plant located in "target" areas should therefore be ready to meet any emergency. Food is vital for our war effort, and not a pound of it should be destroyed by fire from any cause.

Facts About Dehydration Revealed by Microscope

(*Continued from page 54*)

samples have been kept for several months in air-containing jars without development of noticeable off-odors and with an appreciable retention of natural odor and flavor. Sweet potatoes, blanched and dried, keep similarly well.

The sealing effect of the gelled starch, which provides a natural mechanism to protect some dehydrated vegetables against rapid carotene and oil oxidations, suggested the use of a substitute which would have a similar effect upon low-starch vegetables such as carrot. Some experimental drying of carrots dipped in pectin solutions was tried to determine the value of pectin as such a substitute. Unblanched carrots dried after pectin dipping showed only surface protection by the pectin because the living cells of the raw vegetables do not readily absorb the solution. Nevertheless, such samples retained twice as much carotene as did unblanched, undipped carrot after four week's storage in oxygen. Blanched slices, in which the dead cytoplasm offers no resistance, will readily soak up the pectin and afford a better test. As yet, however, information is too incomplete to make any comparisons between pectin dipping and the practice of nitrogen storage as measures to minimize the loss of carotene.

The high pectin content of beets may possibly account for their good keeping qualities when blanched and dehydrated. Loss of color when the dried product is reconstituted cannot be avoided because the pigment in fresh beet tissue occurs in solution in the cell sap. When the cytoplasm has been killed and the slices are placed in water, pigment diffusion takes place readily. The best practice is to blanch beets

whole, then peel and slice them for dehydration. Beets sliced fresh, then blanched and dried, tend to stick together and cause uneven drying because the pectins ooze out from the cells over the surface of the slices. Color loss also tends to be greater with this sort of treatment. Color loss during reconstitution can be minimized if the beets are sliced ¼ in. or less thick and dried so that they will reconstitute rapidly in a minimum quantity of water.

24 Ways To Improve Vegetable Dehydration

(*Continued from page 42*)

weather, I believe automatic humidity controllers are a valuable adjunct to proper operation.

Laboratories are all too few. I can count only 13 control laboratories in all my travels in two months of visiting dehydration plants. And these laboratories include those at such plants as Acme Brewing Co., San Francisco, which produces a spray-dried diastatic malt extract, the meanest product in the world to dehydrate; the Borden Co., Corona, Calif., operating on lemon juice; and the Exchange Lemon Products Co., also at Corona.

Of the other 10 laboratories, five were in active operation on control work. Among the other five, one was under construction, but the chemist has been drafted into the Army. Another was operated by a girl sophomore chemist who was to resume her college training a week after I was there, and no replacement was in sight. She ran moisture determinations by the doubtful toluol distillation method and gave first aid to injured employees.

A third was operated by the office girl, who also made toluol distillations to determine moisture. A fourth was splendidly equipped but had no one available to operate it. The fifth was for the occasional use by the plant manager.

Most of the other plants depend on the feel of the product to decide if it is dried to government specifications, and appear to be happy when the AMS inspector does not reject the samples.

Laboratories or adequate testing equipment should be in every plant, with somebody in charge who knows how to run the proper control tests. Operating a dehydration plant by guesswork is likely to prove a costly error, save to those few plants that operate in climates that are so dry that the very climate saves the management from errors.

You can expect tighter specifications as time goes on. Just as soon as someone discovers how to do a still better job the entire industry will be expected to do equally well.

Coding of various lots of goods is far from universal. Oddly enough, some of the most badly operated plants have the best coding systems, while some of the better operated plants ignore coding. All I can say is this: Wait till you have your first serious rejection or penalty. Then you will want to check up on who, what, when and why. Unless you have coded your various lots, this will be very difficult. And in trying to find out what went wrong you will find the evidence of recording instruments very helpful.

Tunnel Dehydraters and Their Use With Vegetables

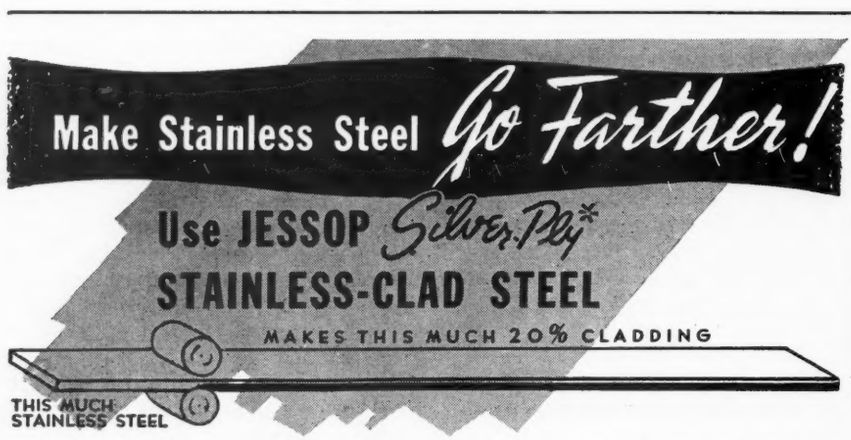
(*Continued from page 50*)

body of the truck hug the floor closely. Trucks should also be loaded with a full stack of trays, so that there is not more than an inch or two of clearance between the top tray and the roof of the tunnel. It is obviously necessary to stack trays as plumb as possible, since if the stack is more than an inch out of plumb it will drag on one side of the tunnel and permit high air leakage past the other side.

Effect of Weather Changes—Changes in day-to-day weather and differences in climate between North and South, or between desert and subtropical seacoast, naturally affect the operation of a dehydrater, but except in some special cases the effect is minor. The reason is that day-to-day changes in weather, and the change from day to night conditions, do not ordinarily produce much change in the *absolute* humidity of the outside air. Within rather wide limits the performance of the dehydrater can be kept uniform, regardless of weather conditions, by a compensating change in recirculation. The following special effects may be noted, however:

1. If the outside temperature falls, the heat input required to keep the dehydrater up to temperature increases. Then if the heating equipment is being used to capacity under daytime conditions, it will be necessary to increase recirculation and consequently sacrifice some capacity, as the outside temperature drops during the evening and night.

2. The effect of changes in weather



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conditions is most noticeable if the dehydrater temperature is relatively low, as it will be in drying onions, for example.

3. If the weather is hot and very humid, it will be impossible to run the dehydrater at a very low wet-bulb temperature. Table III gives the minimum wet-bulb temperatures which correspond to a range of different weather conditions and dehydrater temperatures. These low wet-bulb temperatures can be held only by shutting off all recirculation. The figures are corrected for the moisture introduced by direct combustion of gas or oil.

If the dehydrater temperature must be low, as for onions, and the wet-bulb temperature must be high, it will be impossible to reach a very low final moisture content in the dehydrater. In such cases it will be essential to use a secondary or finishing dryer, supplied with artificially dried air.

Acknowledgment

The author wishes to acknowledge his indebtedness to E. M. Chace, Dr. T. L. Swenson and Harry von Loesecke of the Bureau of Agricultural Chemistry and Engineering and the many members of the staff of the Western Regional Research Laboratory whose work has contributed to the essential background of these articles, and especially to those who reviewed the manuscript. Their suggestions have been most helpful.

Chemists Adapt Pectins To New Industrial Uses

(*Continued from page* 58)

cium. The major difference between magnesium jellies and calcium jellies appears to be the lower melting point evident in the former. Strontium and barium tend to precipitate the pectin rather than form a continuous jelly.

The concentration of metallic salts is usually less than one-fourth of 1 per cent, so that the addition of metallic salts does not have any appreciable effect on the flavor, except in the case of the alkaline tricalcium phosphate, which sometimes causes a noticeable loss of tartness. Where tricalcium phosphate is used, some edible organic acid should be added. It is also possible to use the less alkaline monocalcium salt.

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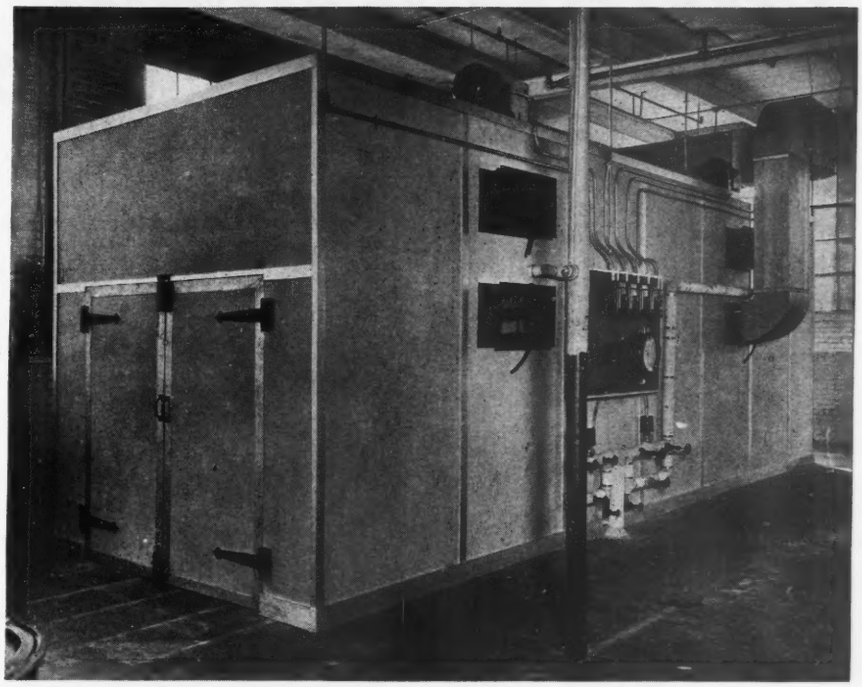
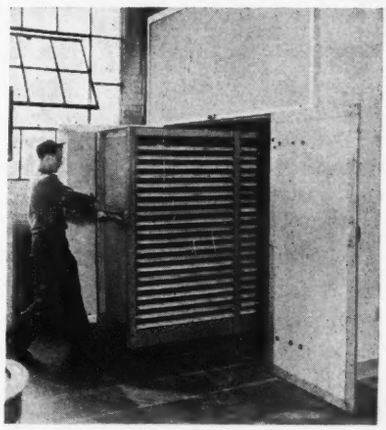
G. Baker and M. W. Goodwin, *Delaware Agricultural Experiment Station Bulletin* 234, 1-46, 1941.

FOOD DEHYDRATION





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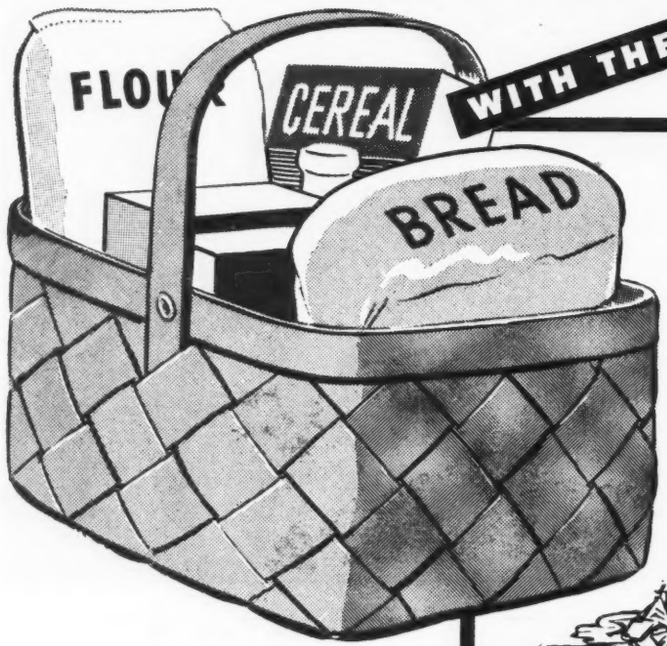
Dehydration Engineering and Equipment

What's Wrong WITH THE AVERAGE AMERICAN DIET?



How your product can help correct a serious mineral deficiency that is sapping the Health and Vitality of a Fighting America.

Surveys have established the fact that an alarmingly high percentage of our population is suffering from some form of mineral deficiency. Our greatest need is for calcium. American diets, according to Professor H. C. Sherman of Columbia, are poorer in calcium than in any other single chemical element. Similar is the deficiency in iron that causes a relatively large proportion of our population to be anemic.

Why does the average American diet fail to supply adequate quantities of these essential minerals? There are two reasons. Most of our staple foods, according to one authority, have been refined to the point of almost complete mineral depletion. The mineral content of our raw foods is growing progressively less, due to the steady impoverishment of our soil.

The easiest and most economical way to compensate for this deficiency is to put these minerals back into the staple food products. Flour and bread have been among the first to receive nation wide attention. Will *your* product be next? Today, with Victor Mineral Supplements you can provide essential calcium, phosphorus and iron in your product *at no additional cost to the consumer.* Through mineralization your product . . . be it soup, candy, cereal, or what not . . . can aid in bringing health and vitality to a fighting America.

With continued education via press and radio the product that is lacking in essential minerals as well as vitamins will soon be at a decided competitive disadvantage. Get the facts about mineralization *now!* Our technical staff will gladly give you any assistance required in solving processing or similar problems. Just write us.

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ARMY E NAVY

VICTOR *Chemical Works*

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FORMULAS FOR FOODS

FORMULA NO. 365

Cumberland Loaf

Veal trimmings	15 lb.
Beef tripe	15 lb.
Beef trimmings	30 lb.
Pork trimmings	30 lb.
Pork backfat	10 lb.
Dry milk solids*	10 lb.
Salt	3 lb.
Invert sugar	3½ oz.
White pepper	7 oz.
Cinnamon	2 oz.
Onion powder	2 oz.
Garlic powder	¼ oz.

* Not over 1½ percent fat.

Directions

Grind beef tripe and veal trimmings through ⅛-in. plate, put in silent cutter and chop fine. During chopping add shaved ice, salt, invert sugar and dry milk solids. Add enough shaved ice to make the consistency a little softer than for frankfurters.

Grind beef trimmings through ¼-in. plate and pork trimmings through ½-in. plate. Cut backfat into ½-in. cubes and scald cubes before mixing with other ingredients.

When ingredients are prepared, place beef and pork trimmings in mixer, add the chopped mixture, backfat and spices. Mix well. Should the mixture be too stiff, add more shaved ice.

When well mixed, place in meat truck and let it cure overnight in cooler. Next day put in parchment lined pans, cover and cook at 160 to 165 deg. F. for 2½ to 3 hours. Chill. Remove from pans and stuff in cellulose casings.

Formula from American Dry Milk Institute, Inc.

FORMULA NO. 366

White Star Fruit Cake

Fine granulated sugar	3 lb. 8 oz.
Emulsifying type shortening	2 lb. 8 oz.
Butter	1 lb.
Salt	2 oz.
Vanilla	1 oz.
Almond flavor	½ oz.
Eggs	4 lb.
Honey, light	8 oz.
Liquid milk (variable)	12 oz.
Bread flour	4 lb. 8 oz.
Cream of tartar	½ oz.

Mixing Directions

Cream sugar, shortening, salt and flavorings together for 5 minutes on low speed. Shortenings should be at 70 to 75 deg. F. Add eggs during mixing on medium speed, for 5 minutes, then continue to cream mixture for another 5 minutes on low speed. Stir in honey, then liquid milk. Sift flour and cream of tartar together, add, and mix about 5 minutes longer on low speed.

The following fruit mixture is then added and mixed thoroughly:

Orange peel, sliced	3 lb.
Citron, slices	3 lb.
Sultana raisins	12 lb.
Cherry pieces	2 lb. 8 oz.
Dates, chopped	2 lb.
Almonds	2 lb.

All fruit, except nuts, is to be washed and drained well. Add the nuts and mix thoroughly. Place in a wooden pail or box, cover with a damp cloth, and let stand overnight before using.

Baking

This may be made up into various sized cakes. Scale 1½ lb. in small rings, or 2 lb. in medium rings. Use 4 lb. in wooden-lined pans 6½x11½x3½ in.

Bake with light steam for 1½ to 3¼ hours at 325 to 350 deg. F. Large cakes must be covered with pans for the first hour, then uncovered.

Apricot glaze or a wash may be applied while the cakes are warm.

Formula from Lever Bros. Co.

FORMULA NO. 367

Peanut Flour Cookies

Brown sugar	3 lb. 12 oz.
Shortening (part butter)	2 lb. 6 oz.
Salt	1 oz.
Eggs (whole)	1 lb. 3 oz.
Vanilla	2½ oz.
Milk	2 lb. 4 oz.
Peanut flour*	2 lb. 3 oz.
White flour	3 lb.
Baking powder	3 oz.

*Partially defatted

Directions

Sift brown sugar to remove lumps, then cream it with shortening and salt. Add eggs and flavoring, creaming well. Mix in milk. Sift the flours and baking powder together so that they are thoroughly blended and mix into the batter lightly. Drop on greased, dusted pans. Bake at 375 deg. F. for 15 to 20 minutes.

Comment. This formula has been adapted from a household recipe published by the Bureau of Home Economics, U. S. Department of Agriculture, and is offered here as a suggestion for new product development in line with the government's nutrition program.

There are certain precautions to be observed in using high-protein flours. It is necessary to sift very thoroughly to blend the flours, but they offer no other difficulty in mixing. Baking temperatures and times must be watched closely. There is a tendency for these flours to brown too much, with damage to the flavor, but the product must be thoroughly cooked. This means that the temperature must be kept down and the cooking time must be as long as is possible without overbaking.

The ratio of peanut flour to white flour is fairly high in this formula. In developing the formula for commercial use, it may be desirable to decrease the proportion of the high protein flour.

The flavor can be improved by addition of a small quantity of nutmeg or ginger. Also chopped nuts or fruit can be added.

FORMULA NO. 368

Celery-flavored Soup Cubes

Sago flour	40 lb.
Potato flour	40 lb.
Celery powder	12 lb.
Onion powder	5 lb.
Salt	16 lb.
Sugar	11 lb.
Milk powder	5 lb.
Pepper	8 oz.
Beef stock	10 lb.

Directions

Place all ingredients except beef stock in a steam-jacketed kettle fitted with a stirrer. Heat and stir continuously.

Let beef stock drip into mixture in pan from an overhead container, continuing heating and stirring till dry.

Press into cubes and wrap.

Formula from H. B. Cronshaw

FORMULA NO. 369

Cheese Pie

Special cheese (Formula 370)	16 lb.
Cheese pie base (Formula 371)	7 lb. 8 oz.
Egg white	6 lb.
Sugar	6 lb.
Algin	1 oz.
Water	12 lb.

Mixing Directions

Cheese mixture. Cook the cheese pie base to a paste with an equal weight of water. Mix the base with boiling water and bring again to a full boil. Add this paste to the special cheese and mix

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thoroughly. Work rapidly, so as to keep the mixture as warm as possible.

Meringue. Make a sirup with the sugar and remaining water (4 lb. 8 oz.), cooked to 245 deg. F. Steam down the sides of the kettle occasionally by placing a tight lid on it. Whip egg whites to a slight froth and slowly pour the hot sirup over them. Bring to about three-fourths volume and add the algin. Then beat stiff.

Fold meringue into the warm cheese mixture, adding about one-third of the meringue at a time and making sure that the last of it is very completely blended.

Baking. Weigh into previously baked shells, allowing 1 lb. 10 oz. filling for each pie.

Handle as quickly as possible after depositing. Bake at 400 deg. F. With an electric oven, have top and bottom switches on medium. Do not overload oven and be sure there is sufficient space so that heat will be evenly distributed. Bake not more than 20 to 22 minutes. Open the damper and crack the door after the first 5 minutes.

This will make about 28 pies.

Formula from Parker-Broeg

FORMULA NO. 370

Cheese Pie Base

Sugar	17 lb.
Salt	8⅓ oz.
Vanilla flavor	1¼ oz.
Oil of lemon	1¼ oz.
Low-fat soya flour	12 oz.
Dried milk powder	4 lb. 4 oz.
Bread flour	3 lb. 6½ oz.

Mixing Directions

Mix the sugar, salt, vanilla and oil of lemon together, then add the flours and milk powder. Blend well.

This cheese pie base can be made up in quantity and set aside for use in Formula 369. The amount given here is about three times that required for one batch of the preceding formula.

Formula from Parker-Broeg

FORMULA NO. 371

Special Cheese For Cheese Pie

Soft-curd cheese	8 lb.
Firm-curd cheese	8 lb.
Sugar yolk	1 lb.

Mixing Directions

Run the soft cheese curd through fine rolls and place it in a mixing bowl. Add the sugar yolk slowly, while beating to free it from lumps and smooth it out thoroughly. Finally, add the firm curd cheese slowly, while beating. Beat smooth and put through fine rolls. Chill.

Formula from Parker-Broeg

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What Can I Do?

EVER SINCE that Sunday morning when havoc swooped from the skies upon Honolulu, a new question has been churning about in millions of American minds. It is this: What can I do to help my country win this war?

This insistent question has pushed aside all matters of personal interest. From now on, individual wants and wishes must give way to the paramount needs of the nation. We all accept that. We have undertaken a huge job. Or, I should say, we have had a huge job thrust upon us. And unless we see that job through successfully it won't much matter what any of us may want.

That job is to win this war.

No longer are we trying to prepare for a war that we may get into. Today we are trying to win a war we're already in—and in up to our eyes. Nothing that any one of us now can do to help himself can get him very much if it does not also help our country to win this war.

I am sure that those who read these words will find many things to do. Some will enlist in the armed services. Some will become active in civilian defense. Some will labor to relieve distress in their home towns. Some will work with organizations set up to serve the men at the front. Each can and will find something he can do.

But this insistent question "What can I do?" goes beyond the individual and his personal service. It re-echoes through the offices and the shops of every American business concern. And what I have to say here is not directed toward individual effort. Rather is it intended for the men and women of American industry who make that industry a living part of American life. Today they are asking themselves: What can industry do? Or better still, what *must* industry do if our country is to finish the job it has started?

Those of us who work in and with American industry have one supreme obligation. We may feel very patriotic; we may be willing to serve "in any capacity;" we may be willing to sacrifice . . . if necessary. But if we fail to meet that one obligation, we shall fail our country in its time of need.

THAT SUPREME OBLIGATION IS AN HONEST DAY'S WORK, EVERY DAY, FROM EVERY MAN, EVERY WOMAN, EVERY MACHINE. . . .

IT IS AS SIMPLE AS THAT!

And that goes for all of us, whether we are engaged in civilian production or working directly on the weapons of war. American victory can be won only through the productivity of American industry.

Efficiency in production is not the responsibility of a few. It can be achieved only as we all put to useful purpose every minute of our time, every ounce of our energy, and every pound of our materials.

This responsibility of industry is the more vital because of what has happened to the business of making war. There was a time when success in war was chiefly a matter of well-trained, well-disciplined armies and competent leaders—when men were everything. In those days, military strength was a matter of strong battalions and able generals. Both still are vital. But today military might is essentially mechanical might. Modern war is an industry just as much as a factory or a railroad. In the first World War, mechanical equipment was relatively simple and limited. But today the special equipment of war and the expert skill needed to use it spell the difference between victory and defeat.

We Americans are not expert war-makers. That is why we must expect to suffer grievous losses before we can win substantial gains. We do not have military training and experience ready to hand when we need them. Neither do we have, ready for action, enough of the machines that are so essential to modern warfare.

So, when it becomes necessary to fight for our lives, we must start from scratch. And today, after a year's effort, we still are not ready to trade blow for blow with enemies who for years have schooled their leaders, trained and disciplined their people, and organized their industries to make war. We shall need more time to develop our strength. And while we are doing that, we must expect reverses.

But there is a brighter side to all this. For it follows that if we are granted this all-important time, the change in the method of warfare is right down our alley. The greater importance of mechanized equipment plays straight into the hand of the world's greatest industrial nation . . . if there is one thing America does know, it is industrial production! Our industries know how to produce. They have the skilled manpower. They have the organized facilities. Beyond any doubt, we can produce all that we need to win the victory that we *must* win—if only we are given the time.

THE FIRST RESPONSIBILITY OF THE ARMED FORCES IS TO GAIN THAT TIME FOR US.

THE FIRST RESPONSIBILITY OF INDUSTRY IS TO USE TO THE FULL EVERY SECOND OF THAT TIME IN PRODUCING THE WEAPONS

THE ARMED FORCES NEED TO WIN THE ULTIMATE VICTORY. INDUSTRIAL PRODUCTION IS THE KEY TO VICTORY. BUT IT MUST BE BIGGER PRODUCTION AND FASTER PRODUCTION THAN WE EVER HAVE KNOWN.

Heretofore American industry has worked to produce more of those things which make our lives more enjoyable. Today it must divert much of its energy from the products of peace to the weapons of war.

This change sets up a new yardstick of industrial performance. In time of peace we measure production efficiency in terms of money saved. From now on, we must measure efficiency chiefly in terms of time saved. For the plane, the tank, the gun, or the ship that is ready when it is needed to win a victory, is worth a million times more than the one that is delivered too late to avert a defeat.

Everyone knows how short we are of some materials and machines. But our most tragic shortage is the shortage of time. So whatever we may waste in the days ahead—and unhappily we are bound to waste plenty—let us never forget that the most deadly waste of all is the waste of time.

Time wasted never can be replaced. No one ever has discovered a substitute for time. If we would avoid the waste of this irreplaceable ingredient of victory, we must use every minute of it effectively—*while we still have it.*

That goes for us all. It goes for the man or the woman at the bench, at the desk, at the counter, in the field, or in the executive office. It goes for the politician as well as for the business man. It goes for the humblest and the most powerful. A nation at war cannot carry deadheads. It cannot spare a square foot for any one who will not pull his weight.

In this war, nothing short of complete victory can save the liberties of us all, rich and poor, employer and employee, haves and have-nots alike. The price of that victory is the labor, the loyalty, and the devotion of every last one of us. Winston Churchill said it well for the British people. You know how he said it. I need not repeat it.

All this imposes upon American industry, its owners, its managers, and its workers, the gravest responsibility they ever have assumed. If our country is to survive as a free nation, American industry must rise to that responsibility. If our country should fall, it would fall because American industry fell short of the need. It would be another case of "too little and too late".

This grave responsibility calls for the keenest management industry ever has known. It calls for unremitting research to make the most of our resources. It calls for the reduction of waste to a record minimum: that goes for waste of time, labor, and material. It calls for keeping our machinery working as near to full capacity as we can contrive. It calls for the highest rates of unit production we ever have known. That will mean skillful coordination by management and the most intelligent cooperation that the men in the shops can give. It calls for inventive ingenuity to match that of a nation which has produced some of the world's outstanding technical genius. For this is a war of technical proficiency.

But above all, it calls for a new devotion to the day's work. For so long as we are at war, the day's work will determine our country's security.

Whatever may be our material resources and our technical skill, however resourceful our management, however broad the scale of our effort, industry cannot measure up to its prodigious responsibility if any of us shirk the day's work. Right there is where we find the *one* thing we *all* can do—the one thing that is within the power of each of us.

THAT ONE THING IS SIMPLY TO DELIVER AN HONEST DAY'S WORK WHEREVER WE ARE CALLED TO SERVE. HONEST WORK WILL WIN THIS WAR. LOAFING WILL LOSE IT. THE SHOWDOWN WILL BE WHETHER HITLER CAN DRIVE HIS PEOPLE TO WORK HARDER THAN WE ARE WILLING TO WORK. THERE IS NO ONE TO DRIVE US. WE MUST DRIVE OURSELVES!

Is that so much to ask? It is all our country asks of us, the men of industry. It is all that the men who must work the guns and tanks in the field ask of us. It is all that the men who work our ships and our planes ask of us. "Give us the planes, the guns, the ships, the tanks, and all the rest of our tools," they tell us, "and we'll give you the victory that means so much to us all. But, in the name of that victory, give them to us quickly—QUICKLY—QUICKLY!"

Is that, I repeat, too much to ask of us?

* * * *

To help American industry achieve ever-higher standards of efficiency has been the traditional mission of McGraw-Hill for three-quarters of a century. Normally that effort has been directed toward higher efficiency in the business of peace. But, as in the first World War, twenty-five years ago, it now is directed toward efficiency in the business of war and in every department of American effort that can contribute, directly or indirectly, to the achievement of victory.

And to that mission, I here pledge every resource of this company, its publications, its books, its staff, and every service it is qualified by experience and training to render to American industry, now enlisted in our common cause.

That is what we of McGraw-Hill can do. And that is what we *shall* do to our utmost.

James H. McGraw, Jr.

President, McGraw-Hill Publishing Company, Inc.

This message is appearing in all McGraw-Hill industrial and business publications, reaching over a million readers.

"Ten Silver Months . . ."

"EVERY WEAPON *we make today is worth ten that we might produce next year; for this year – 1942 – is the critical year in the existence of the United States.*"

This grim challenge was thrown at American industry by Donald Nelson in his first speech as chief of the War Production Board. He was speaking to a group of business paper editors, called together to receive at first hand Mr. Nelson's urgent message to the industries they serve.

"We've wasted the golden months", he declared, "the months in which we could have expanded our steel industry, our chemical industry, our copper industry, and all the others, so that we would have plenty of everything. But we still have ten silver months – the months that remain in 1942–and in them we can do things that we never thought possible."

To that objective Mr. Nelson has dedicated his high talents and boundless energy. And to that task he asks American industry to apply the full measure of its resources and skill.

That challenge should be all that it takes to exact from industry the last ounce of its energies. For by now we all can see that in this war the American way of life is at stake. American industry is the essence of the American way of life. Neither can survive without the other. So, even if it had no better reason, industry must go all out to win this war as a measure of self-preservation. Here self-interest and patriotic duty are synonymous. American industry cannot afford to let America lose this war.

The 1942 job is crucial. If it is well done we have a chance to win. If it is badly done we cannot possibly win. There is the measure of the responsibility that now rests upon the shoulders of industrial management.

It is not just Donald Nelson who asks this of industry. He speaks for the millions of fighting men – on land, at sea, in the air – the world over, whose eyes turn so desperately to the workshops of America. There and there alone can they see the hope of victory.

The people of America are not going to let those men down. They demand of industry every effort and every sacrifice that may be necessary to back them up. On that score, American industry stands, of necessity, on trial before our people. It must come through – or else!

* * *

As industry goes all out to meet this demand, its management asks of those who set its tasks and supervise its performance the utmost possible cooperation. It asks of them specifically an understanding of its problems and a chance to work them out without unnecessary interference. It asks for protection against attack from the rear while it concentrates its energies against the common foe. It asks a truce on economic reforms and social experiments that have nothing to do with winning the war and that are bound to arouse misgiving and mistrust amongst the proprietors of industry. Above all, it asks that it be not made a political scapegoat for every deficiency that is sure to develop in the confusion of a war effort.

This does not mean that industry resents honest criticism or constructive direction. Neither does it mean that it is unwilling to do its best unless it can have its own way in all things. The managers of industry are practical men. They know better than anyone else that unprecedented conditions call for new methods, that they must be open-minded to every criticism sincerely directed toward winning the victory. They know that no one can afford to be smug in the face of a national crisis.

There would be no point to my rehearsing here the pros and cons of such criticisms. Time is too short for that. Only in its performance can industry write a convincing answer to its critics. But as a help toward the achievement of that performance, I should like to clear up, if I can, one prolific source of misunderstanding and mistrust.

I refer to the solicitude of industrial managers as to where their companies may find themselves after the war. *This concern for the future sometimes is misinterpreted to mean that management is blind to the urgency of the present. But it does not mean that. It is a perfectly natural anxiety that must be felt by any responsible management operating under the American enterprise system – which is one of the things we are fighting to preserve.*

Under our system, the managers of industry cannot but feel a sense of responsibility to its owners, not merely for current dividends on their investments but also for the conservation of their properties. That means they must feel some concern for what may happen after the war to a business that now must go all out for the war. That, indeed, is but part of a general concern over what may happen to the whole American way of life after the war that we are fighting for its preservation.

To give practical effect to that concern under present conditions is one of the problems of management. It is not an insuperable problem. Competent management will be able to surmount it, I am sure. But the right kind of help from those in authority can make the job a lot easier. And let us note in passing that the problem cannot be written off, as some critics of business seem to think, merely by setting off against it the profits that business can make on war contracts. That misses the whole point.

For a business enterprise is not, as many seem to think, just a "profit-machine." It is not set up and operated by its owners and managers for the sake of this month's or this year's profits, without regard to any other consideration.

The fact is that any worth-while business must operate as a going concern. It consists not only of stockholders and managers, but also of employees, markets, distributors, and dealers. Mostly, I might say, of markets, distributors, and dealers. They are the "reason for being" of any business, the source of its payrolls and its profits.

No competent management wants to scrap such essential elements of its business just for the sake of war-bred profits, however large they might look . . . at the moment. Most of the original reluctance to get into arms production, for which industry has been criticized, was not due to a "greed for profits", as has been charged. Rather did it arise from management's mistrust of "war profits" that can be made only by sacrificing the essential elements of a healthy business.

* * *

But now industry faces a dire national emergency. The survival of our country and all its institutions – including American business–is at stake. So management must shape its course to meet without stint every need of the war

effort. That means it must subordinate to that effort every other concern. To lose the war is to lose all. We must first win the war if we would save anything.

To the men of management that presents a grave responsibility. It is fair to ask whether government can do anything to help them meet it. One simple thing I think government can and should do. It cannot dissolve all the concerns of management, but it can help substantially.

Government should do all it can to help management conserve those assets of business that will contribute to post-war reconstruction, when that can be done without prejudice to getting on with the war.

Let me explain. Broadly speaking, every business comprises three elements. One is its tangible assets – its factories, machinery, equipment, and materials. Another is its productive capacity – its management, organization, trained working force. A third is its intangible assets – the goodwill, familiarity, acceptance, and recognition that it enjoys amongst its dealers, customers, and prospective customers.

When the nation goes to war government becomes the one dominant customer of a business. Of these three elements, the first two – plant facilities and organization – become of paramount importance to the job in hand. But so far as the government buyer is concerned, the third drops to minor importance.

But that third element cannot be ignored by the managers responsible for that business. For it will be their mainstay when they must rebuild that business after the war, when government has lost all interest in its existence, except as a source of tax revenue. That is why government can help greatly if now, during the war, it recognizes the legitimate concern of management to conserve those assets that will be essential to survival after the war.

Everyone recognizes the obligation of government to demand that the individual business go all out for war production, to forbid the production of goods not essential to wage war and to commandeer those that are, to require that a business sacrifice its markets and disrupt its distribution organization. No one questions the right of government to restrict arbitrarily the amount of earnings that a business may retain as profit from its war activities. In short, no one questions the right of government to become the dominant partner in any business that may be needed to win the war and, as dominant partner, to put the national need above any conflicting interest of the business.

But, as it does all this, government should remember that the survival of that business is staked on the public's knowledge and use of those discontinued or commandeered products, on the stability of that crippled dealer organization, on the ability of the business to maintain its standing in a market-place from which, temporarily, it may be barred.

And government can help management to deal with the exacting task it now faces, if it will do all it can to avert the needless sacrifice of business interests that do not conflict with war needs, if it will but remember that one of these days, that business again will be on its own, gathering up whatever resources it may have left, recreating its markets, rebuilding its distribution channels, reestablishing itself as a going concern . . . and doing all this in a competitive world without benefit of war orders.

The only foundation upon which any business can hope to rebuild when that day comes is its customers' memory of its name and their understanding of its products. Whatever credit may be coming to it for its war effort will not avail it very much if it permits itself to be forgotten. Its chief assets in that day will be the identity, recognition, and acceptance it still enjoys amongst those to whom it must look for business.

That is why so many business men, already going all out on their war jobs, become apprehensive whenever some word or act of a legislator or government official seems to question the validity of their sales, promotion, and advertising activities during the war. For they know that it is by such measures alone that any management can hope to conserve – while its business goes to war – the values it will need when it returns to civilian service.

That is why I ask government to do all it can to allay such uncertainties, to reassure business of its desire to help conserve those intangible assets that mean so much to business security. For that, I believe, will strengthen the hand of management in a big way as it goes all out on the vital job Donald Nelson has staked out for industry.

* * *

He has told us that if we are to make these ten silver months productive enough to make up for the golden months that are gone, industry must do things it never thought it could do. That is dead right. For America now finds itself in a position it never thought it could be in.

All too slowly, but very surely, it is dawning upon us that this is OUR WAR. Moreover it was our war long before we knew it or did much about it. So our job today is not merely to match the current production of our enemies. That is not enough. We must produce also enough to match the surplus of resources they had built up before we got started. We must produce enough not only for our own needs, but also for all the United Nations.

Moreover we must produce all that we need for *decisive* victory, for anything short of that will mean defeat. If we would save the American way of life, we must destroy once and for all the forces that threaten it. A stalemate would mean but an armed truce and what that might do to the American way of life and to American industry no one dares to guess. Victory must mean *decisive* victory. And this, very definitely is our war.

And just as definitely, this is OUR YEAR. For in this year – 1942 – we must prevent our enemies from achieving an advantage that might put victory forever beyond our reach – despite all our vast resources. It is an appalling fact that victory may slip beyond our grasp – not in 1943 or in 1944 – but during the months just ahead of us.

"Industry's responsibility in all of this is great," says Donald Nelson. "The job will take brains and initiative, but we can do it if we go out with a will."

To Mr. Nelson, that initiative means that industry must lead rather than follow in the march to more intensive use of our machines and our man-power. We dare not wait for new facilities to meet our mounting needs. More and more we must press for more widespread subcontracting and conversion. And he is counting on that initiative, backed by ever more aggressive effort, to avert or to minimize the compulsory measures that now seem imminent.

"We must stop thinking about what we're going to do to the enemy in 1943 and start thinking of what we're going to do to him in March of 1942.We must make today the things we would be making next year . . . if we had the time to spare."

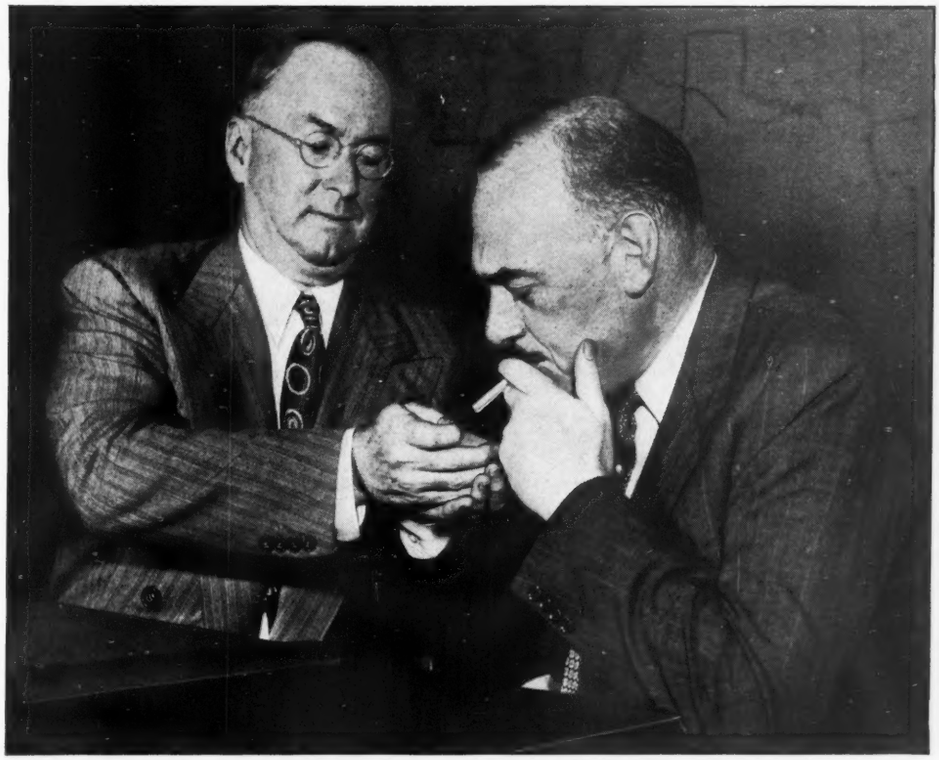
That, says Donald Nelson, is the task of American industry during the next "Ten Silver Months." And to that gigantic task American industry now must bend every ounce of its abundant strength.

James H. McGraw, Jr.

President, McGraw-Hill Publishing Company, Inc.

This message is appearing in all McGraw-Hill industrial and business publications, reaching over a million readers.

The Story That Must Be Told



Two men who know the story best: Donald Nelson, Chief of the U. S. War Production Board, and (right) Oliver Lyttelton, Great Britain's Minister of Production.

BETWEEN THE LINES of today's war news is written a story that is even more vital than the news itself. For through that story we begin to discern the pattern of victory, not yet complete in all its details but increasingly clear in its essentials.

It is the amazing story of how American industry has responded to the call for the weapons of total war, of how its technicians, workers, and managers are driving through an unprecedented task of fantastic size and complexity.

France fell in June 1940. During that month this country produced about $150,000,000 in war goods. By June 1941 the Nazis had overrun the Balkans; and in that month our war production was $800,000,000. The fateful month of December 1941 gave us an output of $1,800,000,000—an increase better than tenfold in eighteen months. And in May 1942 our total expenditures for war equipment and supplies mounted to the staggering total of $3,500,000,000.

This is an increase of twentyfold within two years, of itself a stupendous industrial achievement. But what is even more important, that achievement already is making itself felt the world over—in the Orient, in Australia, in Libya, in Europe, in the Coral Sea, at Midway Island, at the Aleutians, and wherever else we find a battlefront manned by free men.

To accomplish it, many industries have been pouring out war materials at a rate that only six months ago did not seem even remotely possible. Starting from scratch, our factories have turned from their peacetime jobs, first to meet and then to surpass the most hopeful estimates of what might be expected of them.

To do this they have drawn heavily upon all of their resources. Their skilled and unskilled

man-power has thrown into the task a war-born will to work; their research staffs have bent to it all of their scientific resources; their engineers have applied to it their utmost ingenuity; their executives have devoted to it the full measure of that managerial skill which has won for American industry the respect of the modern world.

For the first time in history we have pushed the accelerator of the world's greatest engine of mass production down to the floorboard. Always in times of peace, factory men have had to gear production to what the markets would take. But now the market they are called upon to serve is hungry for the last ounce of potential output. For war confronts industry with a demand limited only by its capacity to produce.

During these feverish months, while a desperate world has watched breathlessly to see how American industry would perform as the arsenal of democracy, we of McGraw-Hill have followed with mounting pride — at times almost with wonder — a new miracle of industrial achievement.

Some day the full story of this American industrial effort will fill a brilliant chapter in the epic history of our times. Meanwhile it would be premature to celebrate the completion of this task. For victory has not yet been won; that still lies at the far end of a road that we may find to be long and arduous.

But even now we can be certain of one essential of that victory. American industry is doing its job; it is delivering all that the people have asked of it — and more.

As I have watched with my associates the unfolding of this picture, I have wished that it were possible to broadcast it, in full color and wealth of detail, to the people of America, so that they could understand at least, in part, the job their industry is doing for them. It would help, it seemed to me, if the men of industry themselves, each so intent on his own task, knew what their fellow-workers in other fields have been doing.

However, the managers of industry have been far too busy ***doing*** to talk. They are going to be just as busy for some time to come. Naturally, many details are yet to be spread upon the record and, indeed, the full story cannot be told. But that part of the story that can be told is well worth the telling and the hearing, if only for its revelation of the spirit of an awakened America, throwing its all into the fight against the tyranny that has brought so many of the world's little people under its heel.

The 1941 war production of the United Nations, exclusive of the United States, equalled the total 1941 war output of Germany with all of its captive plants and enslaved labor. Since Germany's 1941 operations were at maximum capacity no further increase is possible. British output has been expanding to the point where its 1942 production is considerably ahead of Germany's.

In May 1942 American war production passed the British output 50 days ahead of schedule. In 1943 it will be 3 times that of the British.

This has been brought about under the leadership of Donald Nelson and the War Production Board, the Army, the Navy, the Maritime Commission, with the cooperation of management and labor. It has been furthered by the cooperation of Oliver Lyttelton, British Minister of Production, and other British production authorities.

But the story goes far beyond that. It gives us a glimpse of the America as it will emerge from this war, its industries again setting world standards of production, which will become the spearhead of our post-war economy.

This is a story that cannot be adequately told in generalities. It must be told in some detail. For instance, the great accomplishments of the machine tool industry, the great forward strides made by the aviation industry, the tremendous achievements of the chemical industry, the amazing conversion of many industries will warm the hearts of Americans.

These aspects of the subject deserve the fullest treatment and will be told month by month in these pages until the story has been completely unfolded. We will try to give a concise overall picture of the war job that industry has done and still is doing. You will find it a thoroughly American story of high American achievement in which every American can take pride and from which every American can take hope for the future of his country.

The story is far too significant to be withheld any longer.

James H. McGraw, Jr.

President, McGraw-Hill Publishing Company, Inc.

This message is appearing in all McGraw-Hill industrial and business publications, reaching over a million readers.

Machine Tool Builders . . .

the men behind our war production achievement

IT TOOK GERMANY six years to get ready for this war, and Japan even longer. But in less than twenty-four months American industry, starting from scratch, has caught up with and surpassed the war production of the Axis.

When France fell in June, 1940, we unfortunately had no gigantic munitions makers, like the Krupp or Skoda works, to turn to. We had been devoting our attention to making refrigerators and vacuum cleaners and motor cars and lawn mowers. Ordnance output for our Army was a mere million dollars a month. A sad commentary on our National state of mind and our lack of responsible political leadership.

Yet during June of this year, our industries, transformed from peacetime pursuits, produced close to a thousand times that amount. A thousand-fold increase in two years!

The same spectacular gains hold throughout our war program — for ships, planes, guns, tanks, a thousand items. We are well on our way toward the 60,000 planes, 20,000 anti-aircraft guns, 45,000 tanks and 8,000,000 tons of shipping that the President asked us to produce in 1942, and toward the much larger production projected for the year 1943.

We are well on our way thanks to a number of factors, one of the most vital being the extraordinary job done by the machine tool industry. For it has equipped America's metal-working shops with the tools they need to turn out the vast quantities of war weapons.

The machine tool industry's importance springs from the fact that almost every metal product, from mechanical pencils to giant guns, is made with machine tools. They transform pieces of steel into parts for automobiles, farm implements and radios — and for airplanes, guns and tanks.

The Garand rifle, highly praised by General MacArthur at Bataan, has 72 metal parts requiring 1040 separate cutting operations on machine tools. A 40-millimeter gun mount is made up of 1500 separate parts, built to the tolerance of a Swiss watch. Each part must be machined, not once, but several times.

No wonder that when the American defense program was undertaken two summers ago, the American machine tool industry was the first to be called into service. Ninety-five thousand machines were wanted as quickly as possible from 250 builders who in peacetime had produced some 25,000 machines a year.

But the demand did not stop there. The Army, the Navy and the Air Force kept asking for more as the war production program was expanded again and again. Nor was that all. The entire anti-Axis world besieged Washington with urgent requests — from London to Moscow, from Ottawa to Chungking.

To a man the machine tool builders responded. New factories and additions to old plants were built, with deliberate disregard of the prospect that all these sharply expanded facilities could not be used after the war.

To increase output from existing plants practically every company went to two long shifts or three short ones. The industry's work-week was greatly extended. From the beginning of our effort, it has been the longest of any industry.

Working forces were enlarged from 40,000 to 110,000, and this latter figure does not include tens of thousands of employees with sub-contracting firms. Though machine tool building requires a higher degree of individual skill than most products, "learner" courses have been set up to train men quickly. Over 15,000 men and women now are in training.

The machine tool builders were among the first to go in for sub-contracting. They have farmed out parts, subassemblies and complete

machines right and left. To meet their needs, for example, repair shops of carpet mills are making milling machines, a laundry machinery company is producing radial drills, and an automobile body builder is making planers and boring mills.

Machine tool manufacturers quickly shelved peacetime practices to concentrate manufacture on the sizes and types of machines critically needed for the war program. They adopted mass production methods wherever possible, although machine tools are essentially a tailor-made product. They sent their sales engineers, as did machine tool dealers also, to hundreds of munitions makers with invaluable advice as to tooling up most efficiently for their particular jobs.

The swift action taken by the machine tool builders shows what private enterprise can do to meet a national emergency. They were the first to institute a voluntary system of priorities.

All of this involved an almost explosive expansion of the industry. Machine tool builders produced an average of only 7,500 machines a year from 1931 to 1934. In an ordinary year, output totals 25,000 machines. But in 1940, it rose to 112,500, and in 1941 to 187,500.

The 95,000 machine tools wanted for the original defense program were built and delivered within eight months.

Today more than 1,000 machine tools are being shipped to war factories every twenty-four hours, and for seven days a week. Each month's output exceeds that of an entire normal peacetime year and is five times that of the depression year of 1932. And each succeeding month is shattering all previous records.

It is this amazing performance that led Under Secretary of War Robert P. Patterson to declare that "machine tools are the foundation on which our production structure is built. American machine tool men are doing a stupendous job. Machine tools are now being turned out at a rate of $1,380,000,000 a year. Machine tool designers have worked to improve tools so much that machine tool effectiveness today is one-third to one-half greater than it was in 1930. Our production today is 16 times what it was—in capacity to cut metal—at the peak of the World War."

The results of this performance by this key industry, so satisfying to the Nation, do not spring wholly from the numbers of machine tools produced. They stem also from their improved quality and greater productivity.

Today's warfare differs radically from that of 1917-1918. It calls for mechanized weapons so complicated in design and built to such a fine degree of accuracy that they are beyond comparison with the weapons of a generation ago.

Machine tools, completely redesigned during the depression years, are meeting these new and exacting requirements. In addition, thousands of machine tools of special design, without counterpart in peacetime work, have been built.

The record of the war industries most directly dependent on the machine tool industry speaks for itself. One tank manufacturer alone is producing more than thirty big tanks a day. A midwestern plant is completing 35 anti-aircraft guns a day, round the clock without interruption. A tank engine factory, tooled up to make 650 units a month, is actually building over 1500 a month. Demolition bombs, destined for Berlin and Tokyo, are being made by the tens of thousands every month. Machine guns are being produced at a rate of 50,000 a month.

These manufacturers, all machine tool users, are far in advance of the timetables set for them.

All this is good news for the American people and bad news for the Axis. It is proof that American industry, with each individual and specialized industry doing its part, is living up to the faith put in it by the American people.

But it is more than that, too. It is a guarantee of our confidence in the peacetime future of American industry and of the free enterprise system under which this miracle has been wrought.

Perhaps more than anything else, the foundation of that confidence must be faith in the farsightedness, the ingenuity, the engineering and designing skill, and the managerial know-how of the machine tool makers.

On them we depend for the most essential tools of the post-war production economy. Without them, our vision of better living standards and full employment through more efficient production and distribution can never be more than a vision.

What they have done as the toolmakers for war is proof of what they can do as the toolmakers of peace. How they have done it as free men is a demonstration of what free men will do.

James H. McGraw, Jr.

President, McGraw-Hill Publishing Company, Inc.

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The Aviation Industry is doing its job...

A Year's Production A Week — Every Week

A MERE hundred planes a month in 1938; 200 in 1939; 450 in 1940; 1,600 in 1941, and today, as this is written, plane production goes on at a rate of 5,000 a month. A previous year's production now in one single week — every week.

So begins the story of the greatest industrial expansion in history; an industrial miracle that far surpasses anything our enemies ever have done or can do. Not only did we out-produce the Axis but the acceleration in our production during the past 12 months exceeded the greatest increase in German output during their forced-draft war preparation of 1939, when their production rose from 1,100 to 1,600 planes per month.

The toughest part of our job was accomplished in 20 months. We boosted deliveries from 100 or so to 1,000 planes a week, passing the combined Axis powers. Today, Germany's curve is flattening; ours is climbing steeply. Lt. Gen. Henry H. Arnold, Chief of the Army Air Forces, assures us that Army contractors will produce not less than 148,000 planes in the remainder of 1942 and in 1943. During that same period Navy contractors will turn out at least 37,000 additional planes.

Manpower in the airframe, engine and propeller industries was increased from 125,000 to 450,000 workers during the past 20 months, with the prospect that the industry will be employing more than 1,000,000 men and women in 1943. Many manufacturers are solving their personnel problems by recruiting women workers. More than 40,000 of them — teachers, stenographers, waitresses, housewives and school girls — today are welders, assemblers, machine operators and inspectors on aircraft production lines. Productive floor space in the airframe, engine and propeller industries expanded from 18,000,000 sq. ft. to nearly 55,000,000 sq. ft. during the last 20 months. Further expansion to more than 60,000,000 sq. ft. may be expected this year and an ultimate figure of more than 100,000,000 is a distinct possibility.

To grasp the full magnitude of this task we must remember that a single medium bomber has 30,000 parts, which are built into 650 minor sub-assemblies to make 32 major sub-assemblies. The entire process involves 30,000 man hours of labor. Each of the two engines in this plane requires 50,000 specialized inspections. Every one of the 50 instruments entails many hours of precision workmanship. Yet today there is one factory turning out 4 bombers every day. Another produces fighters at the rate of nearly 20 a day.

To the amazement of the entire world these manufacturing miracles were accomplished without sacrificing the high standard of American aeronautical equipment. There has been some loose talk about the quality of our combat airplanes as compared with those of our allies and our enemies. Indisputable evidence of the superior stamina of our aircraft under fire is written between the lines of almost every war communique. Every battle record tells a story of heavy losses inflicted at small cost upon numerically superior enemy forces. The consistency of this performance on all the far-flung battlefronts constitutes the most eloquent testimony of the high calibre of our designs, our manufacturing methods and the skill and daring of our pilots.

And let us remember that our decisive victory in the battle of production was not won without headaches and heartaches on the part of management, labor and government.

When the President sounded the call for 50,000 planes in the spring of 1940, the program called for only 5,500 military aircraft. Government and industry reeled from the shock — both determined, however, that it *could and would be done.*

The Army, the Navy and the old Defense Advisory Commission set to work to draft a program. This has been revised many times — upward! Congress then proceeded, more slowly, to modify the laws that would have obstructed the realization of the objective. Then the aviation industry, without contracts, in the face of discriminatory profit-limitative legislation, and with nothing but oral assurances of governmental intentions, went ahead with its Herculean expansion plans. New factories were completed long before facilities-contracts and their funds were forthcoming.

The rugged individualists who had founded and built the aviation industry cast aside their rivalries and embarked upon a period of unselfish cooperation. Priceless engineering experience was exchanged. Material was relinquished for transfer to plants where it was needed more urgently. Successful personnel training methods and experience in the use of women workers were pooled for the benefit of all concerned. During one re-

cent month, the cooperation among eight southern California plants averted more than 1,860 potential bottlenecks in production.

As the lessons of the war dictated the need for greater numbers of particular airplane types, many manufacturers accepted orders for planes designed and developed at rival factories. Striking examples are the long range bombers being turned out by plants where only trainers, fighters or dive bombers formerly were made.

Mindful of the risk involved in educating rivals, thereby creating future potential competition, subcontractors nevertheless were sought and trained by pioneer manufacturers. Makers of toys and wheelbarrows, automatic stokers and linoleum were among those who rallied to the call. Within a year subcontracting rose from 13 to 36 per cent of the total program. It still is rising.

When the automotive industry came into the picture, aviation manufacturers gave generously of their time and knowledge to start the newcomers. Liberal licensing arrangements enabled them to reap the full benefits of technical developments. Automotive engineers swarmed through the aviation plants in search of the exacting "know-how" of the aeronautical industry.

Each type of aircraft that reaches the production stage is the result of long periods of research, design and development. The unseen workers toiling in the wind tunnels and the laboratories of government and industry are the unsung heroes who tirelessly are striving to surpass all previous efforts. Their brilliant accomplishments are eloquent testimony of the superiority of men and women who are blessed with freedom of action and thought. Today more than 20 experimental combat airplanes are under development and will replace older types as soon as they fulfill the exacting requirements of our armed forces. Among these are aircraft that promise to outfight and to out-perform any and all of the much vaunted warplanes of the Axis military machine. And this without loss of production.

Every man, woman and child of all the United Nations may fervently be thankful that those who chart our course in aircraft production have not frozen design to such a degree as to make impossible the immediate adoption of improvements as they come out of these laboratories.

What does this brilliant record mean in terms of final victory?

Every newspaper reader has learned this basic war lesson . . . air supremacy is the essential ingredient of military success. As the balance of air power shifts, so do the fortunes of war.

In those dark days when our output was 500 planes a month, Germany's was 2,000 and the German air force was twice that of our Allies. When we reached 2,000 a month last fall, Germany had advanced to a monthly rate of 2,500. Today, as this is written, we have caught up with the enemy's backlog. The air forces of both sides are about equal numerically and United Nations' production exceeds that of the Axis by 27 per cent. Next summer (1943) both the air force and the output of the United Nations will be double those of all the Axis powers.

That is the pattern of ultimate victory!

The pattern of the peace to follow also is gaining in definition. The airplane has shriveled the world to one-fifth its former size. Its use as an instrument of destruction is but a momentary distortion of the pattern of human progress. Its potential power, as a stern preserver of peace, is beyond imagination. Today's air routes of our Army Air Force Ferrying Command are the international trade routes of tomorrow. Giant airliners, by reducing time and space, will speed fraternity among the nations and disunity will give way to better understanding and goodwill.

Flying freight trains, with aerial locomotives towing glider boxcars, will serve large cities, decentralizing population and giving to inland cities many of the commercial advantages of seaports. Air mail and passenger pick-up lines will fill the gaps between these transcontinental trunk lines and tie in the smallest hamlets. Universal fly-it-yourself services will provide airplane facilities for those who do not own low cost private aircraft. Roadable rotary wing aircraft and family planes of the fixed wing type may even run household errands.

The coming generation of business men who today is piloting our war planes will find aircraft as essential to business as it now finds them essential to victory.

Commenting on our war production record, Donald Nelson has said, "We are today in the position of men who realize that they are actually doing the impossible".

The mass production miracle that the aviation industry – management and workers alike – has performed through the all-out effort of free enterprise can and will serve civilization in peace as it has in war.

With this boundless new medium of transportation and its concurrent technological developments we shall rebuild our way of life to a rich, new fullness upon the ruins of a war-torn world.

President, McGraw-Hill Publishing Company, Inc.

This is the third of a series of editorials appearing monthly in all McGraw-Hill publications reaching more than one and one-half million readers.

The Chemical Engineer cuts years to months...

Born in the turmoil of the last war, he is shaping a new world with mighty swords and magic plowshares

GERMAN CONSUL-GENERAL HOSSENFELDER, writing from New York on March 3rd, 1916, to von Bethmann-Hollweg, chancellor of the Imperial German Government, confidently predicted defeat for the United States because we were totally dependent upon the great chemical industry of Germany. "Americans," he wrote, "can never establish such an industry. They have the resources but they lack the necessary science and technology. And, besides, the conflicting selfishness of American business renders it impossible."

Even before the ink was dry on Hossenfelder's letter a new figure appeared on the industrial scene—the American chemical engineer. With the help of patient, but progressive and venturesome capital, he laid the foundations for the largest and most resourceful chemical industry in the world.

Today he is an all-important figure. For we are fighting a chemical war, even though the emphasis that is placed on planes, tanks, ships, guns and other armament tends to obscure that fact. And this chemical engineer is waging war for us on a prodigious scale. Bombers carry more tons of more deadly explosives because he has developed stronger and lighter alloys and more efficient fuels. Tanks are better armored and wield heavier blows because of products and processes born in chemical laboratories. Ships are welded together by new metallurgical techniques that save precious months over older processes. Gun barrels that are made in minutes instead of hours shoot farther and faster because of better ammunition.

And quantity keeps pace with quality. By mid-year of 1942, explosives were being produced in newly constructed plants twelve times faster than a year ago. Smokeless powder output has been doubled since December. Five times as much TNT was being made in July as in the months preceding Pearl Harbor. One single new plant produces more of this high explosive than did the entire pre-war industry—and several of these plants already are in production.

By what Major General William N. Porter, Chief of the Chemical Warfare Service, calls a "miracle of production," the sort of incendiary bombs that General Doolittle's lads showered on Tokyo were rolling out of our plants within a few weeks after we got into the war. As General Porter puts it, "they were rolling not by hundreds or even thousands, but by the millions." That record he has cited as a tribute to the "ingenuity, industriousness and patriotism" of the American chemical industries.

Yet the General agrees that we have only started to produce in the tremendous volumes that will shortly make Germany, Italy and Japan "revolve on their boasted Axis." Our newest plants are just coming into production. They face no limiting shortages of materials for, in the main, our chemical industry draws its strength from coal, salt, sulphur, limestone, oil, natural gas, coal-tar, air and water—all available in abundance.

We have heard little about the use of poison gas by our enemies. It may be that good reasons for this are stored away in our well-stocked chemical arsenals. American chemical manufacturers have worked hard and long with our armed forces so that if the time ever comes to make good on the President's warning of retaliation, America will be more than ready.

And defense against gas has not been overlooked. Every soldier is equipped with a most efficient type of gas mask, developed through twenty-five years of intensive research. The Chemical Warfare Service already is manufacturing millions of masks for distribution to civilians. Let us hope we may never have to use them. But if we must, we need have little fear of any gas or secret chemical.

This gas mask program has been made possible by a literal metamorphosis of production facilities, as peacetime industries have been converted to war purposes. A lumber company, for example, is making activated carbon from sawdust. Novelty manufacturers of rubber goods are turning out valves and assembling other parts. Former manufacturers of shirts, swim-suits, shoes and beds have converted their facilities and are contributing their share. More than eleven hundred contractors and two hundred and fifty sub-contractors are supplying their full quotas of chemical warfare materials. And production is right up to schedule.

But the bulk of the war job of our chemical industries has to do with items other than weapons and

ammunition. The German Consul-General, in that 1916 report to Berlin, said that many American industries were in a critical condition because of the scarcity of German chemicals. He related in particular that "the cries for help from the world of physicians are becoming louder and louder and more and more insistent." Thanks to our chemical industries this cry no longer is heard. Even though we are again cut off from quinine, camphor and some other strategic medicinals, our homes and hospitals are adequately supplied with synthetic products. Most of these are better and cheaper than the natural materials. The same sulfa drugs that have saved so many civilian lives in recent years have gone to war, with the result that deaths from infection at Pearl Harbor and Bataan are reported as surprisingly low. In this war we suffer no shortages of iodine and potash. Pioneering research in the field of vitamins has led to new industries that are contributing to health and better nutrition.

Those new uniforms the soldiers are wearing are of better quality and will last longer than the shoddy, ill-fitting outfits of 1918—thanks to sunfast dyes and new man-made products. And in the field of fabrics, nylon and the new rayons have gone to war in parachutes and super-strong cords for tank treads and tires.

* * * * *

And that brings up the question that 30,000,000 American motorists are asking with ever increasing concern. "When, Mr. Chemical Engineer, are you going to give us a set of new tires for the old family bus?"

That, I am told, is just what the chemical engineers have set about to do on a scale that is difficult to comprehend. In the words of Raymond Clapper, the columnist, "the synthetic rubber program for this year and the next is the biggest job of chemical engineering ever undertaken in the world." A billion dollar industry is being built at record speed to make almost a million tons a year of chemical rubber to serve our war needs and those of our allies. This cannot be accomplished overnight. Many months are required to design and fabricate complex equipment, much of which must be made from corrosion-resisting metals and alloys. We shall be lucky if a tenth of the desired capacity is in continuous production this year and even more lucky if, by the end of next year, the new industry should be turning out synthetic rubber at a rate of 875,000 tons—using both petroleum and grain as raw materials.

All this, of course, must go for essential military uses but there is reason to believe that in the laboratory and pilot-plant stages we have some promising substitutes and stop-gap materials that may tide us over until the big program starts rolling.

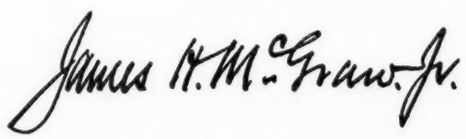
The present prospect of real success is possible only because of the cooperation of the chemical, rubber and petroleum industries. Individual firms and entire industries have set aside their normal desires and selfish interests to pool their patents, share their research and engineering developments for the common good. Synthetic rubber is here to stay as the basis for a great post-war industry: no doubt as to that lingers in the minds of the men who have seen many other natural products—indigo, alizarine, camphor, vanillin—all eventually fall before the ingenuity of the chemical industry.

* * * * *

In the coming peace to which we look forward hopefully, we shall find a new world full of new materials, new conveniences, new jobs, new opportunities, all stemming out of the present-day work of the chemical engineer. The same tough, transparent plastics that now make noses for bombers will give us new frameless windows for our homes and automobiles. With capacity to produce at least 2½ billion pounds of aluminum, which is five or six times pre-war production, and a magnesium capacity 50 or 60 times the pre-war figure, many new uses will develop for these structural materials of great strength and amazing lightness. Almost anything that flies, runs, moves, or otherwise is motive, will have a place for them. New fibers such as nylon and vinyon had scarcely got started before they were put to war use. Once the war is over they will be with us in greater abundance and at lower cost for a variety of uses so vast and so diverse that we can scarcely imagine them.

And the chemical engineer continues to create and to invent. He meets the challenge of scarcities and shortages with ever new "substitutes" that excel their originals. Even before the war is over he will have placed at our command a hundred new materials which we did not have before. His workshop is all industry. His contributions are as limitless as are our needs.

But right now his all-important job is to help win the war; to fight to a finish the ruthless and resourceful enemies that are devoting all their science and technology to bring about our defeat. So, as we take stock of our assets in this desperate struggle, we count among the first the proved resourcefulness of the research-minded chemical engineers we now have mobilized to help us fight this chemical war.



President, McGraw-Hill Publishing Company, Inc.

This is the fourth of a series of editorials appearing monthly in all McGraw-Hill publications reaching more than one and one-half million readers.

Construction—Builder of Bases

America's Great Peacetime Industry Goes to War

PUNCHED through 1,600 miles of trackless wilderness and rivaling the Panama Canal in strategic importance, the Alaska Highway will cut days and dangers from present supply routes . . . to Alaska . . . to the Aleutians . . . yes, to Japan itself!

This job, to be finished soon and well ahead of schedule, is but one example in thousands illustrating how construction sets the stage for our war effort . . . and why the construction engineer is vital to victory.

Back of America's busy production lines, expanding shipyards, growing cantonments and far-flung military bases is a series of swiftly executed construction jobs. Important jobs! *For the construction industry is a builder of bases. Bases for production—for training—for defense—and for attack.*

To conceive and to carry through so tremendous a program in a race against time is typically American. It requires enterprise and the sort of versatility that has been acquired by undertaking every kind of job; from a Boulder dam to a drydock, from a Pennsylvania Turnpike to a housing project, from a Radio City to a railroad tunnel . . . and taking it in stride. War's demands in the eyes of America's construction men, are simply more of the same—for a grimmer purpose, and under heavier pressure.

The civil engineers who develop the necessary designs, the contractors who execute them and the manufacturers who provide the equipment and materials, are as much a part of this war as are the men who face the enemy. The results of their labors are recorded in mounting production figures, and will be indelibly written in the military annals of this war. Those 60,000 airplanes, 45,000 tanks and 8,000,000 tons of shipping that the President asked for in 1942 will be supplied because—and only because—the construction industry did a Herculean plant-building job first—and fast.

This is the fifth of a series of editorials appearing monthly in all McGraw-Hill publications, reaching more than one and one-half million readers, and in daily newspapers in New York, Chicago and Washington, D. C. They are dedicated to the purpose of telling the part that each industry is playing in the war effort and of informing the public on the magnificent war-production accomplishments of America's industries.

Yes, construction, America's great peacetime industry, has gone all out for war. From a normal 6½ billion dollars in 1938, it got into its war stride last year with a 11½ billion dollar volume. And under the impetus of Pearl Harbor, the 1942 figure now promises to reach the unprecedented total of 15 billion dollars. "If buildings would win the war, Hitler would be licked now", said Lieut. Gen. William S. Knudsen recently. Which emphasizes the further fact that the construction industry was the *first* to go to war.

The technical and managerial talent that is accomplishing this mammoth job has had to find its strength and resources within itself. No possibility of "conversion" here! Only years of varied construction experience enabled it to tackle and to achieve the manifold tasks that building for war demands.

Take that cornfield, for instance, that Henry Ford picked for his record-breaking bomber plant. The spring mud was soft and deep when contractors moved in last year. They were entering a race against an almost impossible time limit. Before they could even begin on the plant itself, they had to build roads, lay a 4-mile water supply line and install a complete sewerage system with its disposal plant. But such varied jobs—each big in its own right—merely were antecedent to running up the framework and enclosure for the 60-acre factory itself. Or to using road-building methods to pave a floor that was the equivalent of 25 miles of 20-foot wide concrete highway.

It was a race against the approaching winter, and to win it they had to push their $1,000,000 worth of construction equipment to the limit—day and night. But win they did! It is accomplishments like these that explain how the nation's aviation factory floor space jumped from 18,000,000 to 60,000,000 square feet in

the past two years . . . why Fortresses and fighter ships are beginning to turn the scales of war in our favor.

"Somewhere in the Southwest" the Army called for a training base. The contractor who answered that call summed up his performance in characteristic fashion: "Beginning without so much as a contour map we had a $10,000,000 project ready for operation within 90 calendar days, and saved 3½ million dollars of the estimated cost".

At another Army camp a contractor assembled a crew of 20,000 men who put together 1,400 buildings in 125 working days, along with a sewer system, a water-supply and a street layout of which many a fair-sized city might be proud. This job swallowed up 2,000 carloads of lumber, and 26,000 kegs of nails. So perfect was the teamwork, from the general manager down through the hundreds of superintendents and foremen to the specialized crews, that as many as seventy buildings were erected in one single day.

But versatility and experience are not the only qualities that the construction engineer has in his tool chest. He has ingenuity, and he needed it when steel, copper, zinc and aluminum had to be used for combat equipment, and were denied him. Great hangars, conventionally of structural steel, were turned out with record-breaking timber arch spans. Reinforced concrete factories were designed to require only 3 lb. of steel bars per square foot instead of the customary 5 lb. Asphalt-impregnated paper was substituted for copper in flashings, cement-asbestos for galvanized steel in duct work. In the face of a materials shortage, he continued to build bases—safely, economically, and on time.

Construction ingenuity, too, is back of the records in Liberty ships, in war housing and a host of other facilities. Indeed, it was the construction industry that stepped forward to assume the bulk of the emergency shipbuilding program, leaving established yards free to handle more specialized Navy work. Naturally, it was easy for civil engineers and contractors to build the shipyards, but building ships was another story. It is a far cry from steel ships to conventional engineering structures, yet, drawing upon their bridge and building experience, the men of construction have turned out ships faster than they were ever built before.

How was this possible? . . . because the construction man sees every job as a new problem, views every precedent as something to be discarded in favor of something better. So instead of assembling the myriad separate pieces of each ship on the ways, he fabricated them into huge built-up sections. These he swung to the ways and welded them into place in a fraction of the time required by old methods.

Again, the demands for wartime housing for workers in industrial areas, at Navy bases, and near Army concentrations, have altered the meaning of "residential construction". The building of individual houses has given way to a form of multiple-unit project that calls for the skilled services of the architect, the civil engineer and the large contracting organization. On one such project, for example, a contractor experienced in large building and bridge construction employed an extensive system of prefabrication and site assembly that made possible the completion of 5,000 houses for war workers within five months.

All these activities, within the United States, parallel the achievements of other industries that serve the men at the front. But construction knows no continental limits. Its men are serving throughout the network of defense bases built in the West Indies, Greenland, and Iceland, and in the offensive bases that are taking form in the jungles and deserts of Africa, the harbors of the Persian Gulf, and the plains and mountains of Australia and Alaska. Already in this war, as in the last one, construction crews, like those at Wake and Guam, have dropped their peacetime tools to fight shoulder to shoulder with their comrades in uniform. Construction follows the flag to the farthest outposts in this global struggle.

* * * *

But while the construction industry thus serves the special needs of the armed forces, it must look after its job at home. It must keep the highways serviceable, the water supply safe, sanitary facilities adequate. There are home chores that cannot be neglected even in war.

And when we finish our No. 1 task of winning the war, the construction industry will again be called upon to help re-establish peacetime employment and to stimulate the normal industrial activities of the nation. It will raze, redesign and rebuild; it will bring modern sanitation to urban dwellers; it will safeguard fertile areas and cities from disastrous floods; it will improve all forms of transportation; it will design and build the facilities that will be needed to reconvert from war to peace. Its vision, versatility, experience and ingenuity will be as indispensable then as they are vital now.

Today it is building the bases that are needed back of every battle-line. Tomorrow it will build for a new and better era. Today it is laying the foundation for the victories that must be ours. Tomorrow it will lay the foundation for the peace that will follow these victories. In war and in peace the construction industry is the builder, the harnesser of nature's forces.

President, McGraw-Hill Publishing Company, Inc.

Electronics—Secret Weapon of War

Presager of a New Scientific and Industrial Era

THE END of World War I left scientists with a new plaything. They did not know it at the time but they had their hands on a revolution. Within two years the world had radio broadcasting. Within ten years the whole art of motion pictures had been transformed as talking pictures replaced silent movies. Within twenty years television was born and people were seeing pictures in motion by radio.

The fulcrum of this revolution is the electron tube, a new tool of illimitable possibilities. One form of the electron tube is the familiar radio tube; the much publicized electric eye is another. There are many other forms, each having distinct capacities for saving time, saving energy, saving money, protecting life, limb and property.

The electron tube puts the electron to work—and the electron is the basic building-block of the universe.

Electronics is the new art, the new science of putting the electron to work. Radio and sound pictures and television are aspects of electronics; but there are many other facets of this revolution which have been brewing since the last war.

The electron tube has a typical American family tree. Edison made the basic discovery of the "Edison effect" some sixty years ago. This was followed by the invention of the "Fleming valve" and the "de Forest grid". Then Armstrong contributed his share, and hundreds of engineers in garret and cellar workshops and in the great university and industrial laboratories went to work on the tubes which employ electrons. The tube was a plaything before the last war but the world conflict brought it out of the toy stage and made it a practical, powerful tool.

Today the electron tube is guiding the destinies of the greatest armies and fleets ever engaged in the history of the world.

It is a part of the nerve center of the battleship, directing its course, finding its adversaries, broadcasting running accounts of air battles to its crews, directing gun fire and determining ocean depth.

In the air it is the means of locating and identifying enemy planes, piloting planes automatically, giving communication from plane to plane and to shore. It is even operating the controls of the plane.

In the maneuvering tank, in the officer's car, on the back of a foot soldier it transmits and receives vocal messages from every unit of the fighting forces.

Along our borders, and those of our Allies is an electronic screen which counts, follows and identifies enemy planes a hundred miles away through darkness and through fog.

In industrial plants there are electronic counters that enumerate passing articles faster than the eye can see; automatic sorters which discard defective, oversize, undersize, off-color articles; automatic cutters; devices which inspect the inside of things which the eye cannot see; controls which protect workers; controls of temperature; smoke eliminators; intruder alarms; automatic controls for whole batteries of machines.

In its October progress report on American industry, the War Production Board points out that the radio business is *five* times greater than a year ago. From 20 million dollars a month last fall, it has increased to well over 100 million dollars a month. Unfilled war orders are in excess of 4 billion dollars.

From such vast growth will emerge a new engineering of products which will immeasurably improve our peace-time living.

After the war broadcasting will be infinitely more satisfactory: radio receivers will perform with a new fidelity which will amaze us. Television reception will be as flawless as the motion picture. Present secret war developments will readily be convertible to peace-time devices that will improve our standard of living.

No longer will ships collide with other ships, with icebergs or the shore. No longer will trains collide and aircraft crash in flight.

Garage doors will open as we approach and automatically close themselves. Electric lights will automatically go on and off according to our wants and needs. Furnaces and boilers will be controlled and smokestacks will cease to belch wasteful smoke. Air will be made dust free and germ free. Food contamination will be checked, meat made tender.

Grade crossings will be made safe and auto traffic will be automatically controlled.

Medical science sees new wonders ahead. Already it is possible to see "whiskers" on germs, germs which heretofore had been but a blur when viewed through the strongest optical equipment available.

Today so much secret development is going on in the ultra-high-frequency field that little can be said of its great future. But, without divulging military secrets, it can be said that ply-wood is being dried electronically in minutes instead of hours. Ultra-high-frequency welding (not to be confused with flame welding controlled electronically) is being done dramatically and efficiently.

Ultra-high-frequency heating promises to revolutionize the baking industry—it may even heat our homes.

What is this miracle working tube that can see, hear, taste, feel and smell a thousand times more sensitively than was possible heretofore?

What is the electron? No one knows, not even the scientists who know how to employ it. Electrons cannot be seen or felt; but if 6¼ million million million electrons are pushed through a 100-watt electric lamp per second, it will light up to full brilliance. For electric current merely is a mass movement of electrons. Each electron carries its share of electricity, and since the electron has so little weight it can be moved easily and quickly. Therefore, electricity transported by electrons can be turned on or off with great ease and speed. The electron tube merely is a device that controls the flow of electricity. It is an amplifier of power which can be made to do wondrous things. The sound of a termite gnawing inside of a log can be amplified a million times . . . to a roar that can be heard over great distances.

Colors can be classified and matched to a degree not possible by any other means.

Chemical or vitamin consistency can be recognized by counting radio activity within the subject being analyzed.

There is no industry in which electronic circuits cannot be used to speed up production, to increase accuracy, to do heretofore impossible tasks of calibration and measuring.

The opportunities afforded the engineers who are developing this new "electronic age" are limitless.

* * * *

Today the electronic industry is 100% at war. It is meeting the exacting demands made upon it.

Never before was electronic equipment called upon to withstand temperatures ranging from 75 degrees below to 150 degrees above zero Fahrenheit. Never before did radios and transmitters have to withstand the shaking and abuse to which they are being subjected today.

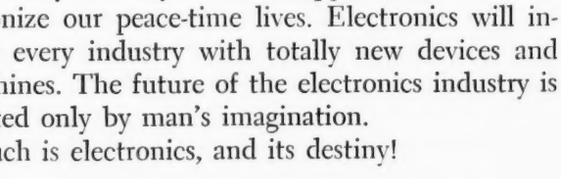
War demands have called for much redesign, much change of materials and a new conception of operating to tolerances never dreamed of in peace-time material. As a result, electronic parts and equipment makers are building better devices.

Universities and colleges are working at top speed to produce electronic engineers, for every radio operator in a plane, every radio man in the ground forces and on ships, every man operating radar equipment or electronic control devices in ordnance . . . and there are many thousands of them . . . must be a trained technician.

The wall of military censorship is high but it is no secret that one of Britain's best weapons that keeps the Luftwaffe from exterminating London is a radio locator, a device that gives alarm of approaching planes long before they can be seen with telescopes. Scanning the horizon constantly the locator warns of the enemy's approach. In the nose of a night fighter, the locator informs pilot and gunner when the enemy is within range. Neither is it a military secret that gunfire can be controlled by electronics, and that electronics is having a big share in training our new armies.

Necessity draws a veil over the most dramatic uses of electronics in warfare, but among those who know there is nothing secret about the fact that many of today's wartime applications will revolutionize our peace-time lives. Electronics will invade every industry with totally new devices and machines. The future of the electronics industry is limited only by man's imagination.

Such is electronics, and its destiny!



President, McGraw-Hill Publishing Company, Inc.

This is the sixth of a series of editorials appearing monthly in all McGraw-Hill publications, reaching more than one and one-half million readers, and in daily newspapers in New York, Chicago and Washington, D. C. They are dedicated to the purpose of telling the part that each industry is playing in the war effort and of informing the public on the magnificent war-production accomplishments of America's industries.

FORTITUDE

America attacks with production.

WE CAN be thankful, these days, for American Fortitude . . . The fortitude of our armed forces will bring victory on the fighting fronts . . . The fortitude of our workmen and manufacturers will overcome the plotting, planning, and more-than-eight-year production start on the part of the Axis; will enable us to out-produce the world in bombs, bullets, planes, tanks, ships . . . Howell Electric Motors are playing an important part in all of these vital war industries . . . They are holding their old friends, winning new friends, with their fortitude as exemplified by their ability to outperform and out-last on the production front. Howell Electric Motors are *better built* by an organization that's all-out for victory — by men and women who cherish the American ideals of liberty and free enterprise and are willing to sacrifice everything to protect them.

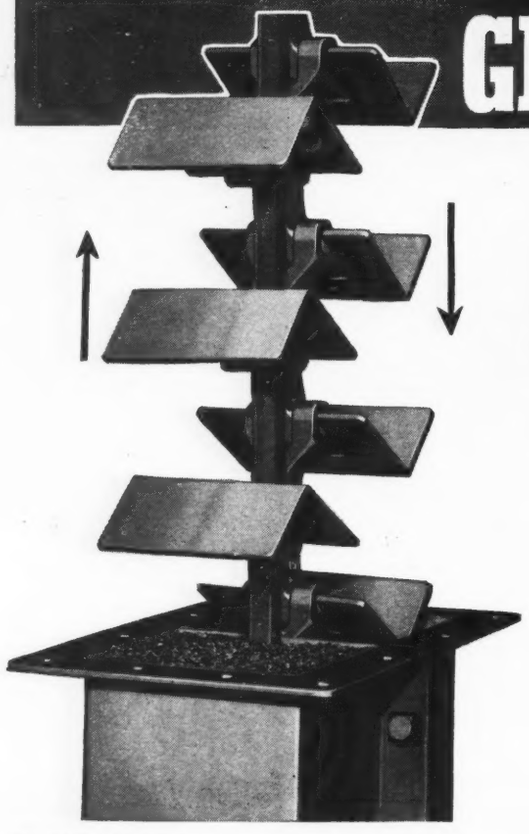
★ ★ ★ ★

The **HOWELL IDEA**
in Electric Motors
precision-built

★ ★ ★ ★

HOWELL ELECTRIC MOTORS COMPANY, HOWELL, MICHIGAN • ***Manufacturers of Quality Motors Since 1915***

GENTLE HANDLING...



LINK-BELT
BULK-FLO
CONVEYOR-ELEVATOR-FEEDER
Minimizes Contamination and Degradation

Bulk-Flo is outstanding in its ability to cut handling costs and to conserve critical materials and save space. It minimizes breakage and degradation, prevents leakage and reduces explosion and fire hazards. The necessity for multiple elevating and conveying units is eliminated, because the same unit conveys horizontally, vertically or on an incline.

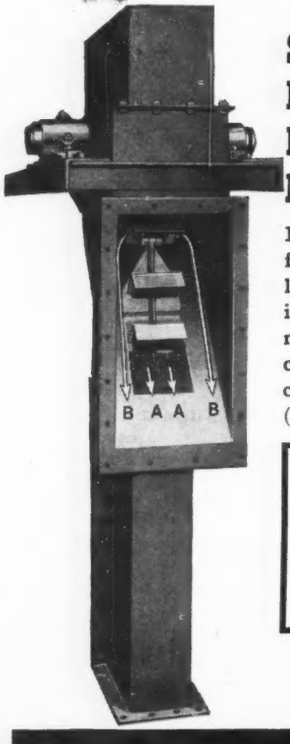
Bulk-Flo is self-feeding, self-discharging and to a high degree self-cleaning. It handles flowable, granular, crushed, ground or pulverized materials of a non-abrasive, non-corrosive nature under all conditions of loading.

Bulk-Flo loads automatically—at one or at several points—without feeders. It automatically discharges at the head end of vertical runs or at one or more points on horizontal runs, or both as desired. There is minimum slippage on partial loading.

LINK-BELT COMPANY

Chicago Philadelphia Indianapolis Atlanta Dallas San Francisco Toronto
Offices, warehouses and distributors in principal cities. 8990

SLOW SPEED Operating at slow speed Bulk-Flo is recommended for materials that require careful handling . . . minimizes breakage and degradation.



SPLIT DISCHARGE REDUCES DEGRADATION

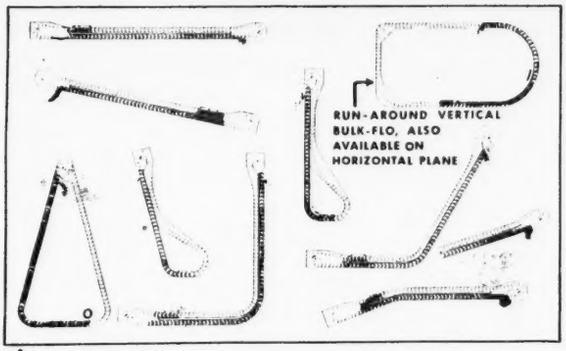
Most of the material falls forward immediately upon reaching gathering chute (see AA). The remaining material discharges rearwardly onto chute and flows forward (see BB).

THROW YOUR SCRAP INTO THE FIGHT!

DUST-TIGHT casing prevents leakage. Bulk-Flo conveys and elevates material in a dust-tight casing, making it suitable for handling dusty products. It is successfully used for handling foodstuffs and chemicals where avoidance of contamination or exposure is of prime importance. These illustrations show the construction of casing and flights.

LINK-BELT Bulk-Flo

....DUST-TIGHT OPERATION

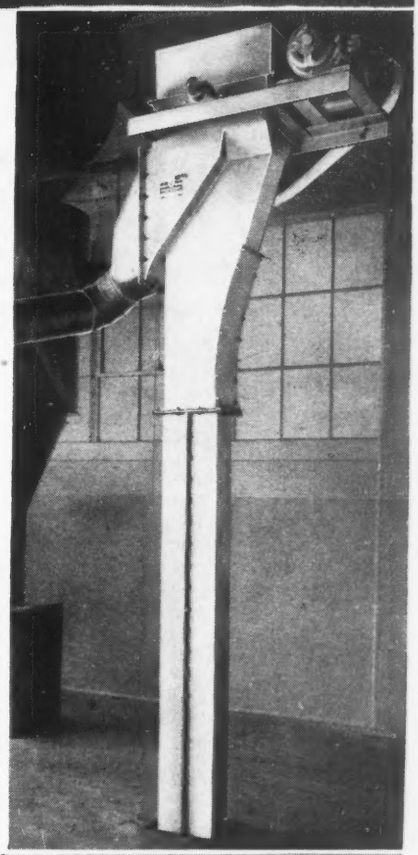


UNUSUAL ARRANGEMENTS

This illustration shows some of the elevating-conveying layouts available, to provide extreme flexibility.

COMPACT DRIVE

Motorized reducer and chain drive are safe, compact, fully enclosed, easily accessible. Speed changes readily made by changing one sprocket.



Send for NEW BULK-FLO BOOK No. 2075

SAVES SPACE

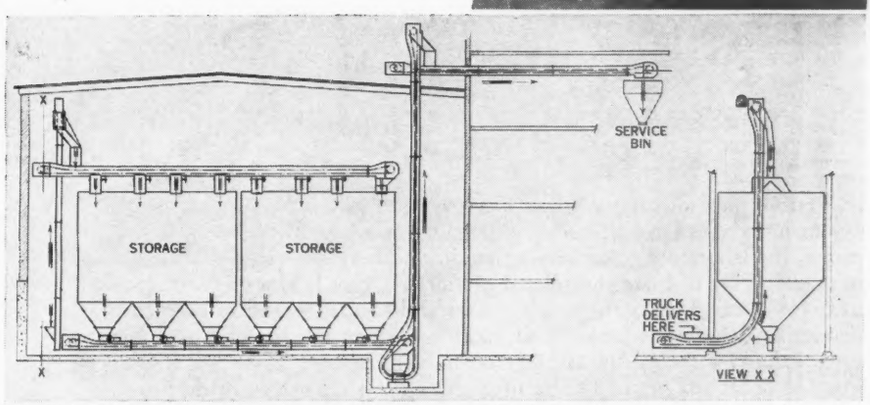
Compact Bulk-Flo casing is so small as to be comparable to a building column. The material moving in a continuous mass occupies almost the entire capacity of the enclosure.

1 TELLS HOW Bulk-Flo handles a variety of loose materials in compartments.

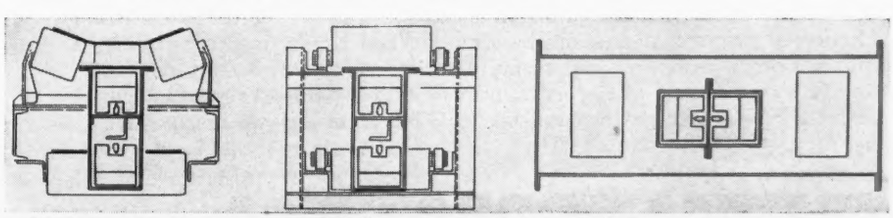
2 GIVES FACTS on installations—and how it assures dustless operation and freedom from degradation. Its operation without feeders is also explained.

3 ACTUAL PHOTOS of the Bulk-Flo handling various kinds of materials. Explains how Bulk-Flo solved handling problems.

4 ENGINEERING DATA gives capacity and horsepower formulae, installation and operating details, assemblies and dimensions.



Five Bulk-Flo units with automatic controls handling granulated sugar from trucks to storage bins at 30 tons per hour and transferring from the bins to a service hopper at 7½ tons per hour.



Comparison of space required for a Bulk-Flo and belt conveyor . . . Bulk-Flo and flight conveyor . . . and Bulk-Flo and bucket elevator. Bulk-Flo is light in weight, requires minimum supports, thus saving steel.

Self-feeding ELEVATOR-CONVEYOR

BACKGROUND VALUES . . . a PART of the product, APART from the price

THESE pictures suggest some of the reasons why it pays food and beverage manufacturers to let us supply the flavorings for their products. For instance, the laboratory, show above, handles nothing but problems pertaining to the flavoring of these and related products. Other laboratories are devoted to flavor research, to perfuming of soaps and cosmetics, and to odorizing or deodorizing countless varieties of technical products. In each case, expert supervision by specialists assures the manufacturer a flavor or fragrance, made-to-order for his particular product. . . . Then we've made provision for ample purchase and storage of essential raw materials. This enables us to pass along to our customers the money-saving advantages of large scale purchases. . . . A third consideration is *quality*. This we control by careful selection of original sources and by sampling and rigidly inspecting every container of oil that enters our plant. Therefore, if you're seeking new or supplementary sources of flavors, remember that the foregoing advantages are all a PART of Fritzsche products, APART from their price . . . and that their use will benefit YOU!

Photos: Upper left—This 3-tier drum rack alone accommodates over 250,000 lbs. of essential oils. Center—Flavor Laboratory. Lower right — Taking samples of an incoming shipment for careful analysis by our Control Laboratory.

FRITZSCHE BROTHERS, Inc.

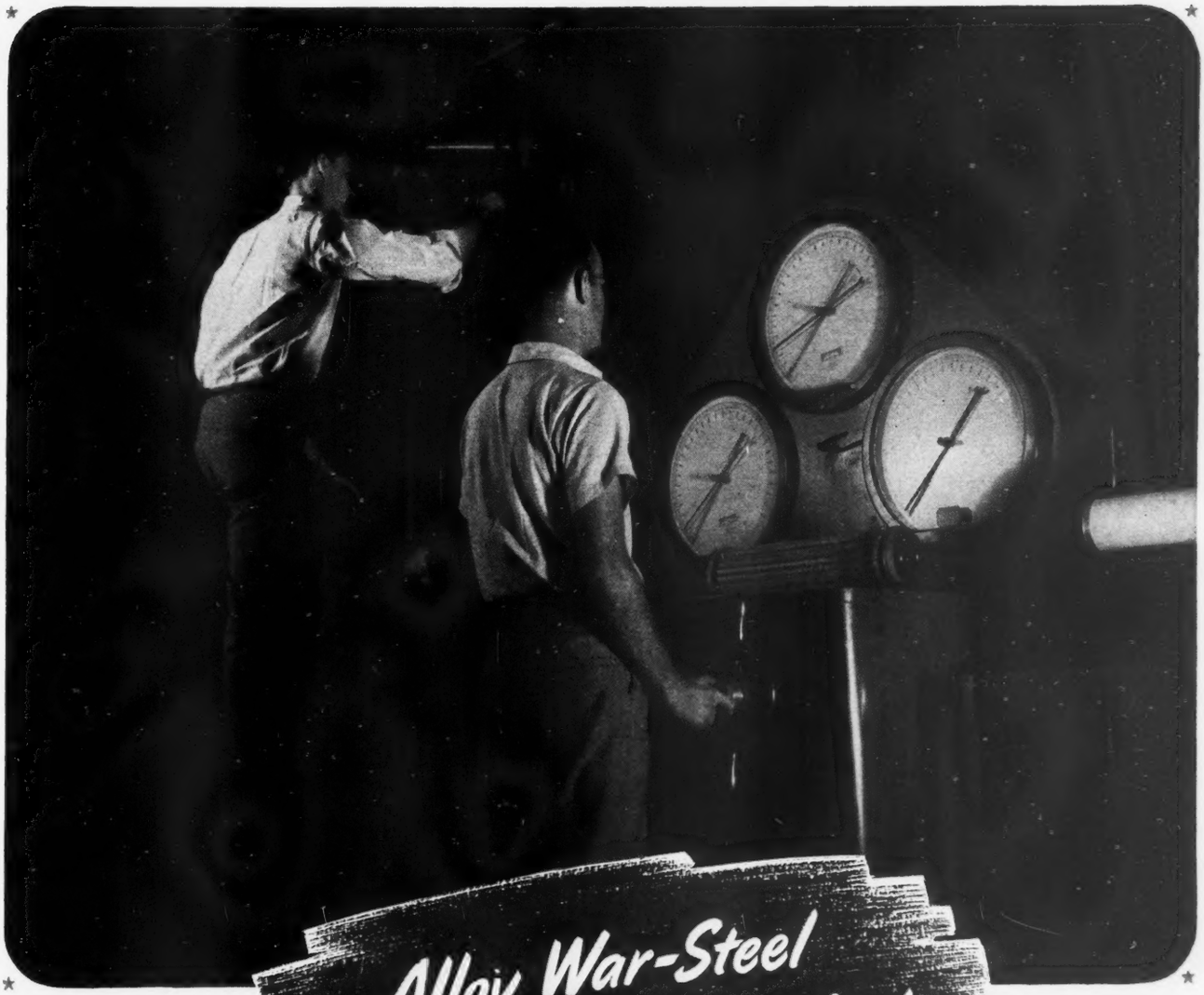
PORT AUTHORITY COMMERCE BLDG., 76 NINTH AVENUE, NEW YORK, N. Y.

BRANCH STOCKS

BOSTON CHICAGO LOS ANGELES ST. LOUIS TORONTO, CANADA MEXICO, D. F.

FACTORIES AT CLIFTON, N. J. AND SEILLANS (VAR) FRANCE

Manufacturers and Suppliers of HIGHEST GRADE FLAVORS, SEASONING COMPOUNDS and ESSENTIAL OILS



Alloy War-Steel reports for its physical

OEM Photo by Palmer, in an Allegheny Ludlum Plant

TESTING is an integral part of production at Allegheny Ludlum mills. Thousands of dollars worth of amazingly accurate machinery are on the job in each mill, testing tensile strength, elastic limit, elongation and reduction of area—all the essential properties of each stainless grade—before it is shipped out for war production.

But after shipping, what? This Allegheny Stainless, made and tested to such rigid exactness, is a war material of the most vital sort. Every alloy in it stands high on the critical list. Is it being used as carefully as it was made? Are fabricators getting the maximum number of products and parts from every ton, with the least possible loss in rejects, spoilage and other forms of waste? Are high alloys being used in places where lower alloys would suffice?

We urge you to check or re-check these questions against your own use of Allegheny Stainless, as a matter of vital concern in national conservation of materials. Especially do so if your plant, as a converted industry, is relatively un-used to the handling of stainless steel.

● We'll help you in any way possible to make the nation's supply of metals and alloys go farther. Technical information, fabricating data, or the personal assistance of our Technical Staff, are yours on request.

Allegheny Ludlum
STEEL CORPORATION
GENERAL OFFICES: PITTSBURGH, PENNSYLVANIA

All America Knows Budweiser... but Few Know This

Starch Helps Make Munitions, Batteries..

Everyone knows that corn starch is used in pies, puddings, cakes and other good things to eat. In addition to various household uses, it is necessary, too, for making batteries, cosmetics, paper and textiles, to name a few. Where does Anheuser-Busch fit in this picture? We learned a lot about cereals from constant analysis of barley for Budweiser. With that knowledge we started a Corn Products Division, which now supplies millions of pounds of starches each year to food and other industries.

Year after year, we have striven with research and resources to better the methods and facilities for brewing Budweiser. To do this, a laboratory specializing in fermentology and nutrition was necessary. Discoveries made in the laboratory and in the plant have led to the development of products contributing to human necessity and progress. Some of these products would appear to have only a remote relationship to brewing, yet, they are the result of scientific research into many allied fields.

Endless research in making the world's leading beer has led to other products

VITAMINS, B COMPLEX—Anheuser-Busch is one of the world's largest sources for manufacturers of pharmaceutical and food products.

VITAMIN D—Our plant produces enough of the basic material for Vitamin D to supply the entire American market.

VITAMINS FOR LIVESTOCK—We are America's biggest supplier of yeast vitamins used to fortify animal feeds.

REFRIGERATING EQUIPMENT—for retailers of frozen foods and ice cream the country over. This division is now working all-out on glider wing and fuselage assemblies for our Armed Forces.

BAKER'S YEAST—We are one of America's biggest suppliers of standard and enriched yeasts and malt syrup used to make bread.

CORN SYRUP—many millions of pounds annually for America's candy industry.

SYRUPS—for food, table and confectionery uses and special syrups for medicinal purposes.

DIESEL ENGINES—Adolphus Busch, founder of Anheuser-Busch, acquired the first rights to manufacture this revolutionary engine in America and thus started our great Diesel industry on its way.

COPYRIGHT 1942

Budweiser

TRADE MARK REG. U. S. PAT. OFF.

ANHEUSER-BUSCH • • • SAINT LOUIS

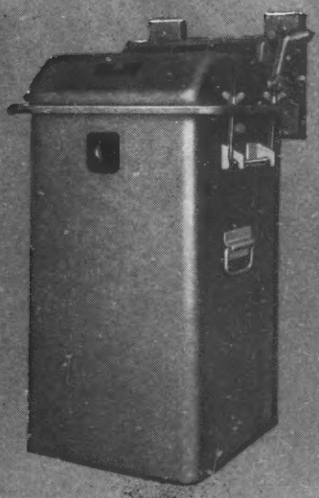
Don't

WASTE MAN-HOURS

AND CRITICAL MATERIAL

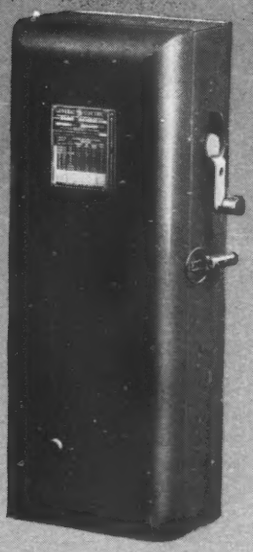
Building Special Enclosures

...there's a STANDARD G-E combination starter to meet every operating condition



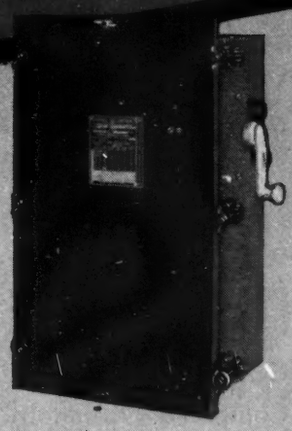
CORROSION-RESISTANT

These starters (Type 8) are made in two forms—one for corrosive atmospheres and one for hazardous locations. All their arcing parts and terminals (for use in hazardous locations) are at least six inches under oil.



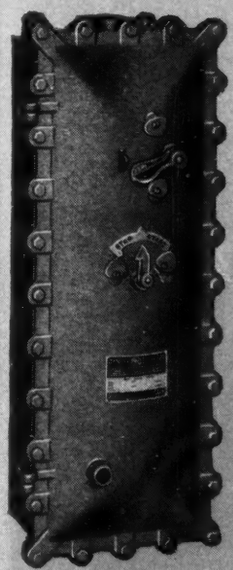
GENERAL-PURPOSE

The Type 4 enclosure is suitable for general-purpose, indoor applications where atmospheric conditions are normal.



DUST-TIGHT

The Type 5 enclosure is for use in steel mills, cement mills, and other locations where the dust content of the atmosphere is so heavy as to make a dust-tight case desirable. The cases are of heavy sheet metal, equipped with heavy gaskets, clamping bolts, and wing nuts.



FOR HAZARDOUS LOCATIONS

The Type 7 case for Class 1, Group D, locations is made of cast, high-strength alloy. These starters can withstand internal explosions. The flanges, which are securely bolted on all sides, are ground to tolerances that will not permit the escape of hot gases.

WATERTIGHT

The Type 4 case is suitable for outdoor use, and for installations in damp places indoors, such as in dairies and breweries.

The Navy "E", for Excellence, has been awarded to 92,780 General Electric employees in six plants manufacturing naval equipment.

Order STANDARDS *to save time and material*

NEVER ENOUGH production time—scarce material urgently needed! Both far too valuable to be spent in building unnecessary control rooms and special enclosures.

But delivered-ready-to-install control isn't all that the General Electric line of standard combination starters offers you.

These starters combine two devices—a fused motor-circuit switch and a magnetic starter—in one compact unit. This saves you one complete mounting job. They come to you completely wired and ready to install—saving all the time and material needed to wire up two individually mounted controls.

If you wish, our local sales engineers will help you select the proper starter for your job from this standard line of G-E combinations—for a-c motors up to 200 hp. *General Electric, Schenectady, N. Y.*

GENERAL ELECTRIC

Before THE CRUCIBLE FEEDS AN ARMY

IN THE PLANTS that prepare the foods essential to the military stomach, *Instruments By Brown* guide the processes through to the finished product . . . Likewise, the very steel that goes into the boilers, kettles and food machines is prepared under the "Watchful Fingers" of *Instruments by Brown* . . . In the plants themselves, atmospheres for employee and product alike are regulated by *Minneapolis-Honeywell Controls*, for greater efficiency in men and more uniform quality in processing . . . *This Combined M-H—Brown* Control Service is available to management everywhere, through all Minneapolis-Honeywell offices . . . Minneapolis-Honeywell Regulator Company, Minneapolis, Minn., or Toronto, Canada, or its subsidiary, Brown Instrument Company, Philadelphia, Pennsylvania . . .

Controls **ARE VITAL TO THE CRUCIBLE OF FREEDOM**

Instruments by **BROWN** *and*
Controls by **MINNEAPOLIS-HONEYWELL**

SOLID FIBRE . . . AND CORRUGATED BOXES

Gaylord

. . . FOR WAR MATERIALS

Boxes

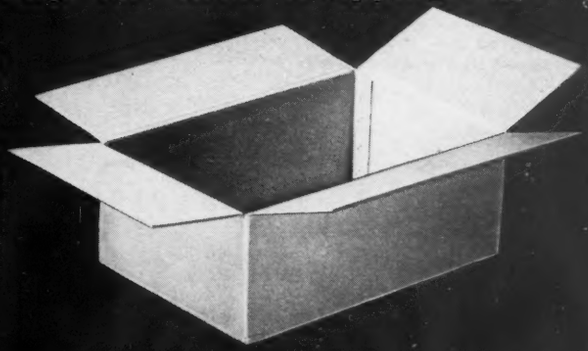
. . . AND CIVILIAN NECESSITIES

Also manufacturers of Grocery Bags and Kraft Wrapping Paper

GAYLORD CONTAINER CORPORATION

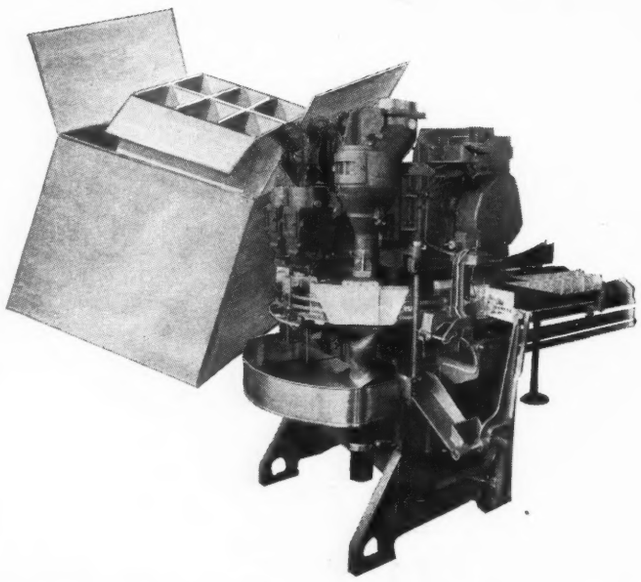
General Offices: SAINT LOUIS

New York • Chicago • San Francisco • Atlanta • New Orleans
Jersey City • Seattle • Indianapolis • Houston • Los Angeles
Oakland • Minneapolis • Dallas • Jacksonville • Columbus
Fort Worth • Detroit • Tampa • Cincinnati • Des Moines
Oklahoma City • Portland • Greenville • San Antonio • Memphis
Kansas City • Milwaukee • Bogalusa • Weslaco • Greensboro



★ BUY MORE WAR BONDS ★

A POUND of prevention for weighing machine designers and users..



Experience has shown that you can eliminate a lot of trouble by improving these three important factors:

A Driving: must be smooth, quiet — efficient on short centers.

B Timing: must be positive to a split-second all the time.

C Conveying: must be jerk-free, slip-free — smooth-as-silk.

Make Good Machines Better With

ROLLER CHAIN BELTS!

PLEASE NOTE

Baldwin roller chain belts transmit power between shafts with nearly 100% efficiency, yet absorb shocks and stand up under conditions of heat, abrasion and corrosion that seriously impair other power transmission media.

★

● Baldwin roller chain belts have a background of use second to none in the food handling industries. That's the best evidence we know for putting them on your preferred list. Their advantages? They are many: 98.6% efficiency; ease of installation on long or short centers and excellent performance on either; extreme cleanliness—are just a few.

For improving machines you are using today, for assuring the success of the machines you're planning for tomorrow, we suggest that you call the Baldwin man and work with him in developing driving, timing and conveying methods you *know* will be satisfactory. Address: Baldwin-Duckworth, Division of Chain Belt Company, 325 Plainfield St., Springfield, Mass.

Positive!

THAT'S BALDWIN ROLLER CHAIN BELTS

Because Your Motors May Have to Serve for the Duration

Send for

These New Century Bulletins on Proper Motor INSTALLATION, CARE, and ADJUSTMENT

★ To help all Century Motor users get longer life from motors now in service, Century offers, free, the following helpful, informative bulletins on motor Care — Installation — Adjustment:

- Squirrel Cage Polyphase Motors, 1/6 to 400 HP
- Integral HP Direct Current Motors
- Fractional HP Direct Current Motors
- Direct Current Generators
- Repulsion Start Induction Motors
- Capacitor Motors — Fractional HP
- Split Phase Motors

Because all Century Motors and Generators now being produced must go to the War Effort, proper motor care and protection is now more essential than ever before. Century Motors are working 'round the clock, often on continuous, 24-hour production — three times normal peace-time use.

To get the most out of your Century Motors, to assure longest, most economical operating life, ask your Century Application and Service Engineer for copies of these new Bulletins, or write direct today.

CENTURY ELECTRIC COMPANY
1806 Pine Street — St. Louis, Missouri

One of the Largest EXCLUSIVE Motor and Generator Manufacturers in the World. — Offices and Stock Points in Principal Cities.

Whenever Possible— Order Standard Motors

Constant speed, continuous duty, open rated 40° C. sleeve bearing, 60 cycle, 3-phase motors are produced in larger quantities than other types and therefore can usually be shipped faster.

300

CENTURY ELECTRIC COMPANY—1806 Pine Street - St. Louis, Mo.

Please send me "Installation—Care—Adjustment" booklets on the following types of Century Motors:

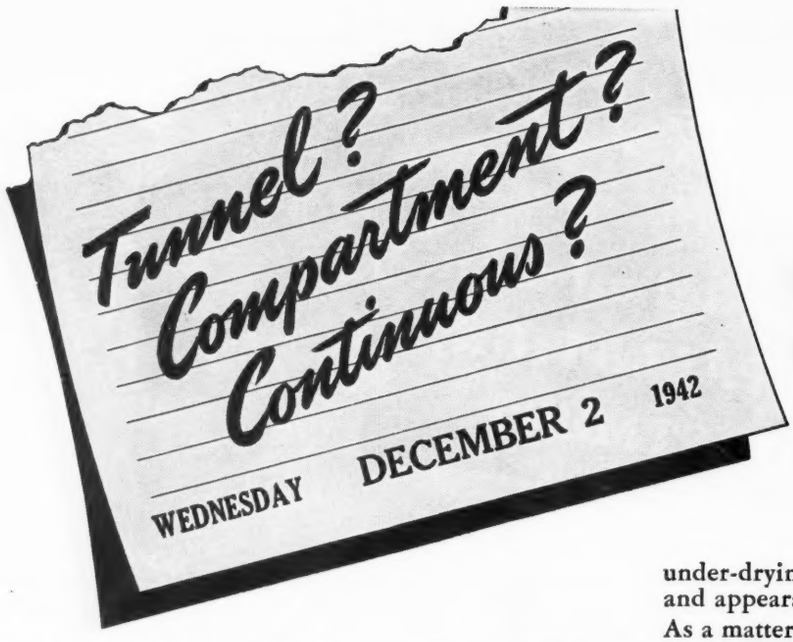
- ☐ Split Phase
- ☐ Repulsion Start Induction
- ☐ Capacitor
- ☐ Squirrel Cage
- ☐ Direct Current Motors
- ☐ Generators—Alternating Current
- ☐ Generators—Direct Current

Name.....

Company.....

Address.....

City..... State.....



Whichever type of dryer you need, you'll get better food dehydration with Taylor Automatic Control!

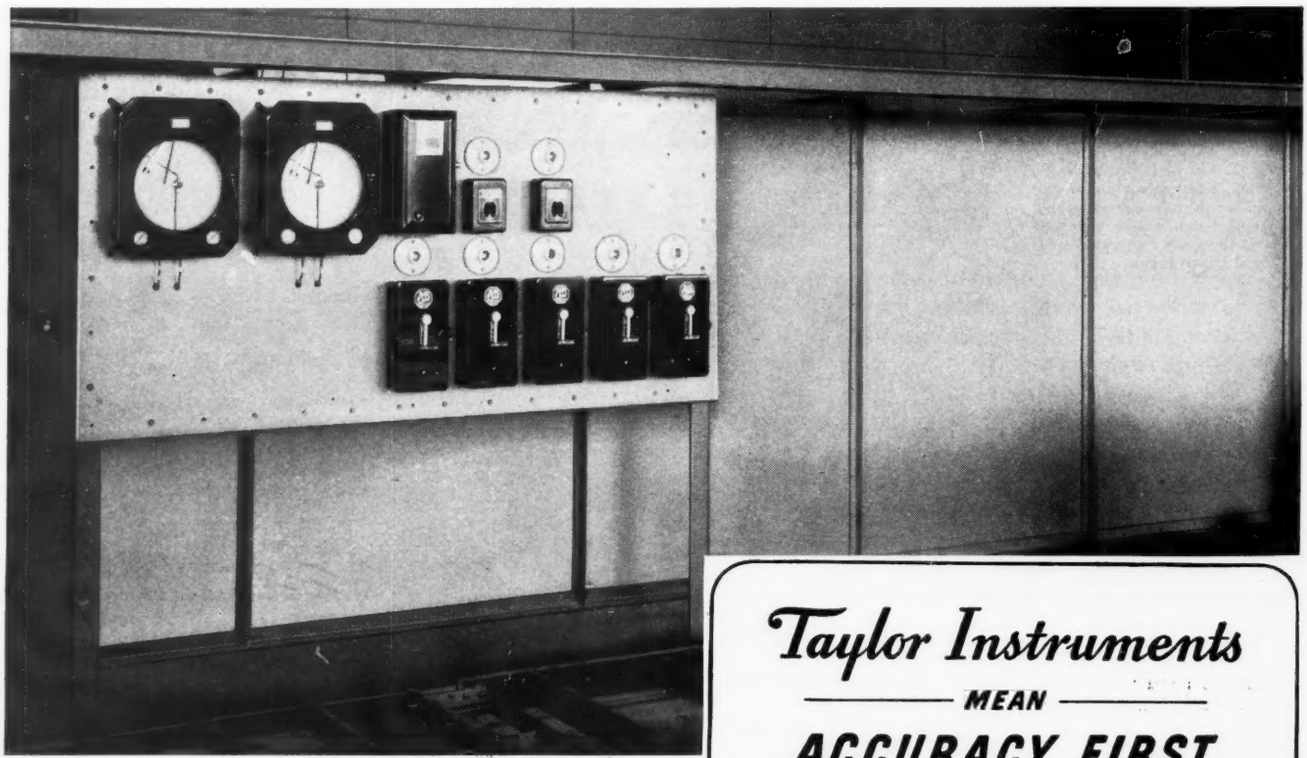
WHAT kind of dehydrating equipment will best suit your particular needs? With so many excellent dryers to choose from, that's a serious question! But there's no question whatever about what type of *control* equipment you need. Regardless of which type of dryer you use for food dehydration, the U. S. Department of Agriculture says:

"The prime requisites are efficient control of humidity, temperature, air velocity, and volume."

This is where Taylor Accuracy comes in. Taylor Automatic Control can protect you against over-drying, under-drying, and waste—and insure uniform quality and appearance in the finished product!

As a matter of fact, most dryer manufacturers are now supplying dryers ready-equipped with Taylor Fulscope Controllers. But if you haven't decided what type of equipment you need, when you make the selection be sure that it is designed for automatic control and that it is Taylor equipped.

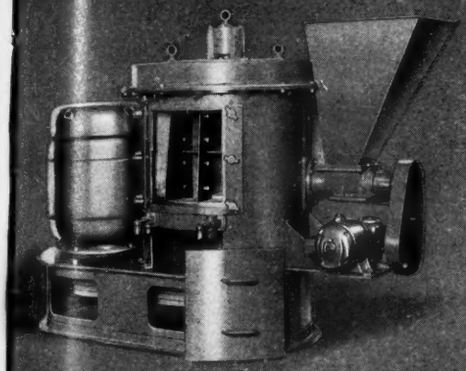
Your Taylor Field Engineer can give you the whole story. We've helped engineer so many food dehydration installations we are confident we can be of assistance to you. Taylor Instrument Companies, Rochester, N. Y., and Toronto, Canada. *Instruments for indicating, recording, and controlling temperature, pressure, humidity, flow and liquid level.*

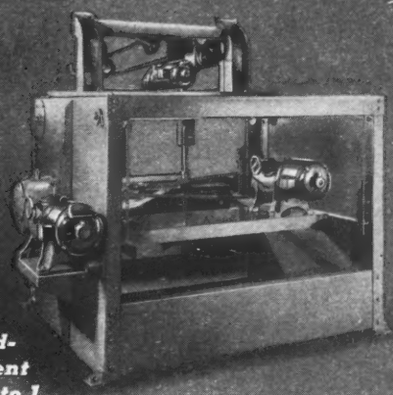


Taylor Fulscope Recording Wet-and-Dry Bulb Controllers on primary and secondary sections of automatic tunnel dryer in a well-known Eastern food plant.

Taylor Instruments
MEAN
ACCURACY FIRST
IN HOME AND INDUSTRY

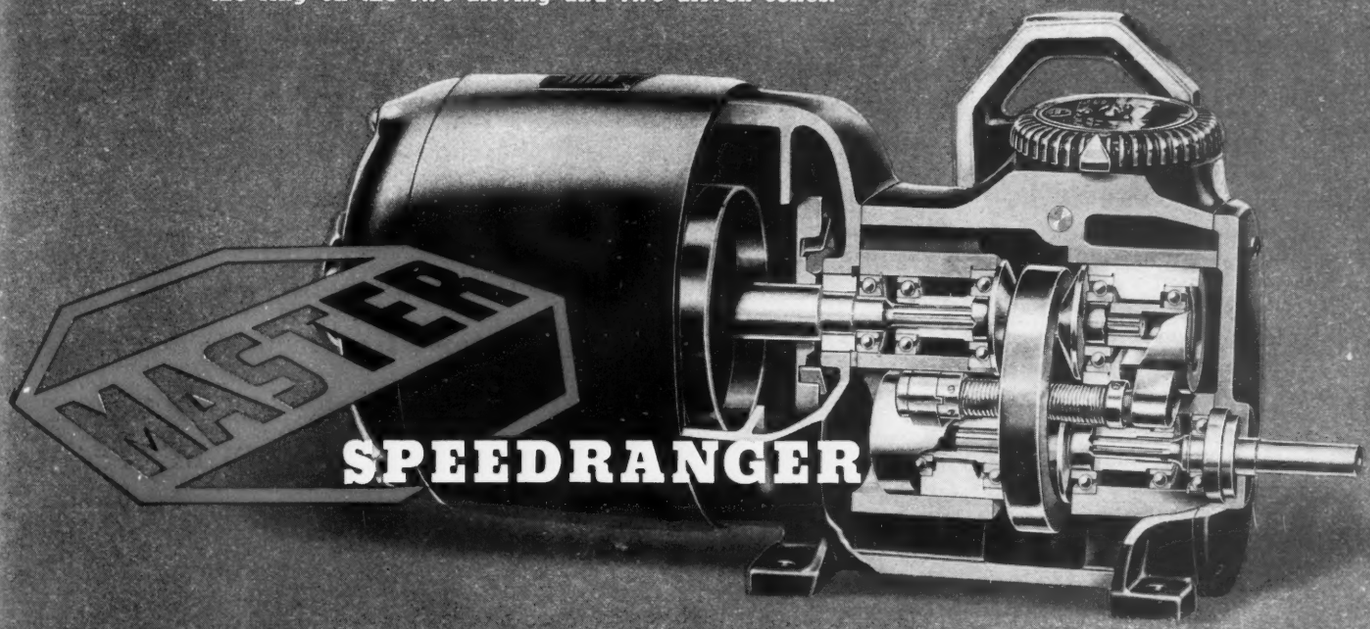
★ KEEP ON BUYING U. S. WAR BONDS AND STAMPS ★





Available in sizes up to and including 3 horsepower in three different speed ranges — 3 to 1, 6 to 1 and 9 to 1. Only with an all-metal drive can you secure the compactness, simplicity, flexibility and economy that are so advantageous today.

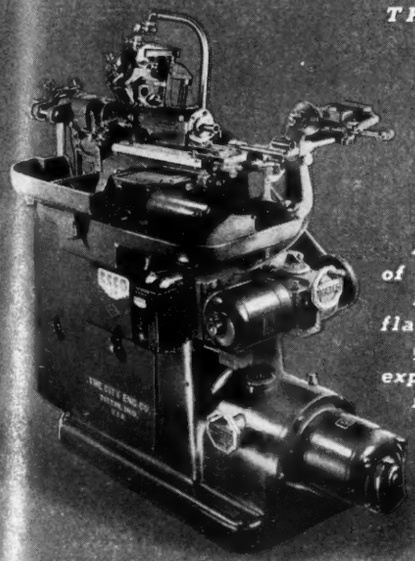
Infinitely variable speed may be secured to any R. P. M. within the range of the unit. The output speed is increased or decreased by variation of the position of the ring on the two driving and two driven cones.



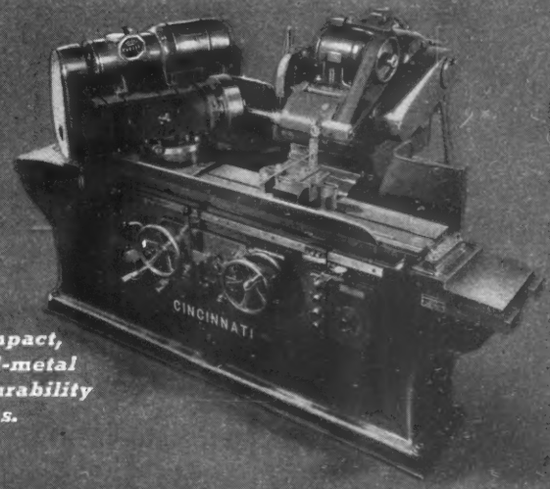
MASTER

SPEEDRANGER

THE MASTER ELECTRIC COMPANY · DAYTON, OHIO



Available in the vast number of types that make up the Master line including the flanged type as shown, also gearhead, unibrake, fan-cooled, explosion-proof, splash-proof, multi-speed, etc.



Save material and save space with the simple compact, integrally built Master Speedranger. The all-metal construction insures greatest possible durability and freedom from service interruptions.

This Simple Care
ADDS YEARS OF LIFE
TO STAINLESS STEEL EQUIPMENT

Certainly, stainless steel is tough and strong. It resists hard wear and abuse—resists corrosion and oxidation. Normally, it will last longer than most other materials—even in the most severe service.

And it could last even longer—if certain precautions were taken and care exercised in cleaning.

Are you doing everything possible to get every available day of service from your stainless steel equipment? Remember—when your present equipment is worn out, you probably will not be able to replace it during wartime, unless you have an extremely high priority.

Here's what to do. Write and tell us the nature of your operations, and we'll send you a poster-size wall card (several if you need them) giving suggestions for lengthening service life and detailed information on cleaning. Individual cards are available for the various types of equipment listed on the opposite page.

This information—prepared by Republic metallurgists from their *UNEQUALLED* experience in the development and application of Republic ENDURO* Stainless Steel—may be the means of adding years to the life of your priceless equipment.

REPUBLIC STEEL CORPORATION
Department FI
Alloy Steel Division
Sales Offices • Massillon, Ohio
GENERAL OFFICES • • CLEVELAND, OHIO
Berger Manufacturing Division • Culvert Division
Niles Steel Products Division • Steel and Tubes Division
Union Drawn Steel Division • Truscon Steel Company
Export Department: Chrysler Building, New York, N.Y.

*Reg. U. S. Pat. Off.

TO ENDURO FABRICATORS: *Tell us how many of these conservation cards you would like for distribution to your customers. We'll gladly furnish them already imprinted with your name and address.*

REPUBLIC *Enduro*

Other Republic products include Steel and rust-resisting Toncan* Iron Pipe, Sheets and Roofing—Upson Bolts,

STAINLESS STEEL

Nuts and Rivets—Electrunite* Condenser and Heat Exchanger Tubes—Berger Lockers and Shelving

AIR — against WATER

Rising and falling with the waves . . . men on a rubber raft . . . human lives snatched from the sea . . . by a thin layer of inflated rubber.

Important? Yes. It's important that the thin sheets of rubber be kept free of cracks and blisters, that the raft unfold easily, that it be *safe* when it's needed.

That's why rubber life rafts are processed in special air conditioned rooms . . . to make the rubber tough and long-lasting. *Room temperature and humidity are maintained more exactly than ever.*

To do jobs like this, air conditioning equipment must be more precise, more flexible, more compact. Required "climates" must be reproduced faithfully . . . wherever and whenever wanted.

General Electric has already taken an outstanding part in developing this new kind of air conditioning for war industries. After the war, *all* users of air conditioning will benefit from the lessons we have learned in meeting these stringent war requirements.

More people will enjoy air conditioning because it will be more compact . . . more economical. Cars will have it. Also planes and boats. Small stores, as well as large, will want it to increase sales, to keep goods fresh. Factories will demand it as an aid to production.

The place to turn for this new equipment will be General Electric . . . a logical source of heating, refrigeration, air conditioning, and heat transfer equipment of all kinds. Turn to G-E.

Air Conditioning and Commerical Refrigeration Department, Division 427, General Electric Co., Bloomfield, N. J.

Air Conditioning by

GENERAL ELECTRIC

Little TRAPS KEEP *Big* KETTLES HOT

AT the Habitant Soup Company, Manchester, N. H., little Yarway Impulse Traps are doing a big job in keeping soup kettles hot.

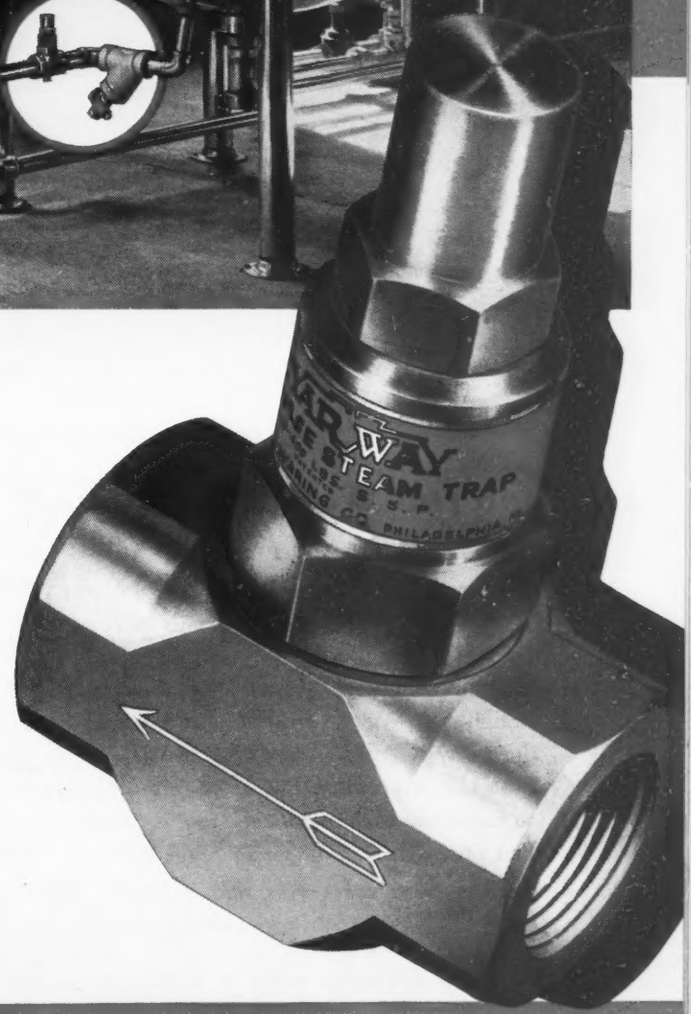
Not only for quicker heating and greater sustained heating efficiency; but for many other distinct advantages—Yarway Impulse Traps are replacing less efficient, less dependable devices in many plants.

Have you investigated this Trap about which users say—"Saves space"—"Easier to install"—"We like its flexibility on different pressures"—"Saves maintenance trouble and expense"—"Cheaper to replace with Yarways than to repair old-type traps,"—etc., etc.

More than 180,000 Yarway Impulse Traps have already been sold and present sales are at an all-time high.

See your Mill Supply Distributor, or write for Bulletin T-1737.

YARNALL-WARING CO., 127 Mermaid Ave., Philadelphia, Pa.



YARWAY IMPULSE STEAM TRAP

The Axis started this war of machines... but Uncle Sam's Army is coming up fast with the weapons to finish it! One of the newest and most effective is this giant Mack Army Prime Mover.

Made-to-Order

for the World's Toughest Customer...

The Army's newest and biggest prime mover is probably the best single job in truck history. Most of its details can't be made public... but you can see for yourself that it's *big*. And we can tell you that it hooks up to a whale of a big gun, takes on a terrific load and goes almost anywhere except straight up. We're proud of it, at Mack, and with good reason. Proud that the Army called on Mack men and facilities to develop and build it. Proud, as Americans, that our fighting men are getting fighting equipment so fine. And proud that this, too, is "built like a Mack truck"... with all that phrase has stood for in ruggedness and reliability for forty-two years!

Mack Trucks, Inc., New York, N. Y. Factory branches and dealers in all principal cities for service and parts.

Mack

TRUCKS
FOR EVERY PURPOSE
ONE TON TO FORTY-FIVE TONS

BUY U. S. WAR BONDS

IF YOU'VE GOT A MACK, YOU'RE LUCKY... IF YOU PLAN TO GET ONE, YOU'RE WISE!

There's "FIGHTING PUNCH" in Every POUND of Your SCRAP METAL!

DO IT TODAY!
Turn in your Scrap Metal. Every Pound is needed NOW! The Production of America's Steel Mills must *not* be— "Too Little—Too Late"

Turn it in NOW...when it is so sorely needed to—

"KEEP 'EM ROLLING"
"KEEP 'EM FLYING"
"KEEP 'EM WINNING"

Without your scrap and all that others can supply, the Steel Mills of America cannot operate at VICTORY Capacity!

"Throw your Scrap into the Fight"
Solid stainless scrap is especially needed.

INGERSOLL STEEL & DISC DIVISION
BORG-WARNER CORPORATION
310 South Michigan Avenue Chicago, Illinois
Plants: Chicago, Ill.; New Castle, Ind.; Kalamazoo, Mich.

"A Borg-Warner Product"

INGACLAD
STAINLESS-CLAD STEEL
and INGERSOLL SOLID STAINLESS STEEL

HERE is Buying Information-

The 5th Edition of the ONE VOLUME Buying Guide and Reference Source — FOOD INDUSTRIES 1943 CATALOGS & DIRECTORY

● This edition is in the hands of more than 12,000 processing and production engineers and executives in America's important food plants. It is being used for quick reference to help meet today's emergency demands for greater production of high quality foods, greater conservation of essential material at less expense.

War Brings a Revolution in the Food Processing Industry—To meet present and future demands plants must be expanded to feed the United States — armed and civilian forces — and a large part of the rest of the world.

Fixed standards of quality must be maintained (Government dictated) regardless of shortages of processing equipment, packaging material and supplies and personnel.

Pace must be kept with technological improvements in all phases of food production. The sudden and tremendous demand for dehydrated, compressed and frozen foods is changing factory routine in hundreds of plants. The Directory is planned to be helpful in supplying wanted information.

Helpful Buying Information—"... it gives us a chance to compare equipment from different companies, and I have found equipment listed that I did not know existed. It has been a real help all the way through."—quoting a typical comment from users of the Directory. The present edition will be as helpful in supplying buying information—with particular stress on the application of equipment and material and supplies required in new processes and packaging born of war needs.

HOW THE 1942 EDITION HAS HELPED FOOD PROCESSING MEN

★

"The Food Industries Catalogs and Directory was used as a general reference book and guide. This organization is now purchasing from most of suppliers listed."

H. G. Myers, Purchasing Bureau Buyer, Quality Bakers of America, New York, N. Y.

"In view of our diversified and extensive operations we use many different kinds of equipment. As time goes on will use even more. Should like to see continued and expanded when and convenient to do so."

F. W. Fetterman, Superintendent, Libby, McNeill & Libby, San Francisco, Calif.

"We often use Food Industries Catalog and Directory as a reference book when we are in doubt about a piece of machinery and we find the reference section of the book very valuable."

G. C. Freeley, Manager, Neosho Valley Cooperative Creamery Assn., Erie, Kans.

". . . and find it extremely useful. One of the valuable features to me is the complete set of definitions and standards for food products adopted under the Food, Drug and Cosmetic Act up to the time of publication of your book."

F. C. Blanck, Quality Control Dept., H. J. Heinz Co., Pittsburgh, Pa.

". . . would say that your 1942 Catalog and Directory has been in constant use by our organization."

L. E. Malcom, Canned Meat Production Dept., Kingan & Co., Indianapolis, Ind.

"We found the Food Industries Catalog & Directory valuable in our office and have passed on some of the formulas listed therein to our bakery trade. Kindly include us on your list for 1943 edition."

George Cockburn, Central Mercantile Co., St. Joseph, Mo.

"Greatest reference book our business ever had, don't see how any manufacturing concern selling to milk trade can afford not to have one."

H. L. Smith, Wayne Cheese Co., Clyde, N. Y.

"We have referred to 16 different companies — some, from whom we have purchased materials — others we just wanted information in detail, and got it."

Donald C. Thayer, Production Manager, Food Service Company, Akron, Ohio

"We refer to this catalog frequently . . . In converting equipment to glass pack, I have looked at it a number of times. Accept our thanks for the book."

H. Schutt, Lindsay Ripe Olive Co., Lindsay, Calif.

● ***FACTS ON EQUIPMENT, MATERIALS AND SUPPLIES:***

SECTION 1
Single and Multi-page Manufacturers' Catalog Data

Turn to Section one—here are more than 100 pages of manufacturers' catalog information which picture and describe the products of leading suppliers of the Food industries. These pages give you sizes, speeds, capacities and other performance data which you can use to speed your production, cut costs.

● ***TO FIND THE FIRMS THAT MAKE A CERTAIN PRODUCT:***

SECTION 2
Classified Directory of Manufacturers

Here is the list of all manufacturers of machinery, equipment, and supplies. The names are classified alphabetically by product, with catalogers names in bold face type, giving page reference to the catalog section.

You will find more than 500 products used in the processing of foods. (In using this section always look for the principal word such as "Filter", "Mixers", etc.)

● ***NAME AND ADDRESS OF MANUFACTURER:***

SECTION 3
Alphabetical, Company Name, Address and Trade Name Index

A complete alphabetical listing of the companies making the products which are listed in Section 2. This gives a cross-index and further simplifies the use of the volume.

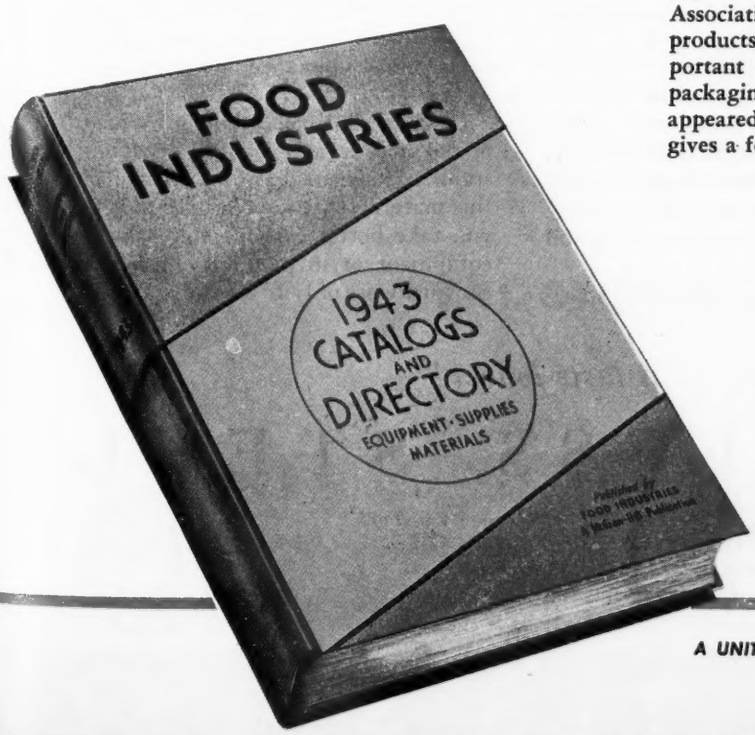
● ***CHECKING ON LEGAL ASPECTS OF YOUR PRODUCT:***

SECTION 4
Food Definitions and Standards of Identity

The 4th Section is valuable for reference. (a) Here are given Government definitions and standards of identity for foods. (b) List of Federal laws affecting foods, with the names of enforcement agencies. (c) Geographic list of State Food Law Enforcement Agencies.

Plus

(d) *National and Regional Trade Associations* as well as State and Local Associations. (e) *Food formulas* – over 200 of them for many varieties of products, reprinted from FOOD INDUSTRIES. (f) *Flow Diagrams* of 20 important food processes – through the stages of preparation, processing and packaging. (g) *Bibliography of Articles on Dehydrated Foods* which have appeared in FOOD INDUSTRIES. This is of particular war time interest and gives a forecast of post war sales opportunities as well.



FOOD INDUSTRIES CATALOGS & DIRECTORY

A UNIT OF THE McGRAW-HILL REFERENCE SERVICE, 330 W. 42d ST., NEW YORK, N. Y.

Today's performance

WILL DETERMINE TOMORROW'S MATERIALS

WAR fosters change. And this fast-moving industrial war is certain to knock a lot of "established" methods and preferences into a cocked hat. For the most part, in progressive industries such as food packing, only those materials, equipment and practices will survive which have stood the gruelling test of war and proved themselves superior in quality, economy and productivity.

U·S·S Stainless Steel is ready for that test. True, little of it can be supplied now for building new food-handling equipment. But thousands of tons are in service in pasteurizing equipment, evaporators, cooking vats, and dozens of other applications. If you know where it is used in your plant or any other food plant, we urge you to keep a critical eye on its performance during these war years. Compare it with any other material in terms of resistance to corrosion and heat, strength, lasting qualities, easy maintenance, product protection and long-term economy.

We believe such a candid comparison will give you a new appreciation of the advantages of U·S·S Stainless Steel for food equipment. It should provide a valuable basis for selecting or designing new equipment when peace releases metals now made scarce by war.

In the meantime, although we may not be able to supply your needs for stainless, our intimate knowledge of this material is at your service to help you take better care of your present equipment or in planning ahead for the future use of U·S·S Stainless Steel.

"Be glad it's Stainless . . . it lasts longer!"

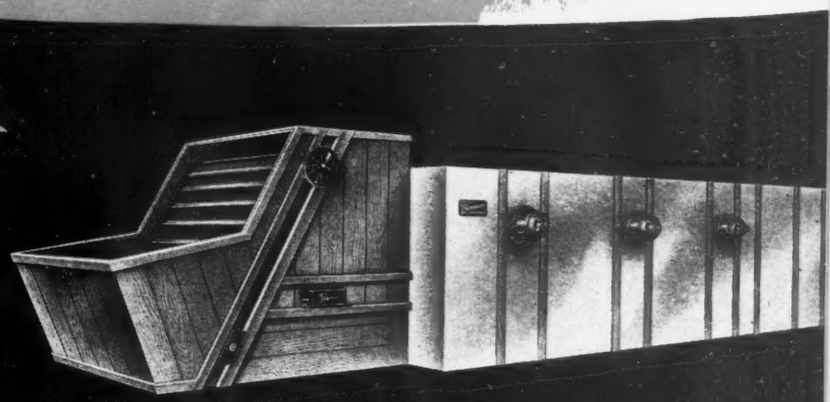
U·S·S STAINLESS STEEL

AMERICAN STEEL & WIRE COMPANY, *Cleveland, Chicago and New York*
CARNEGIE-ILLINOIS STEEL CORPORATION, *Pittsburgh and Chicago*
COLUMBIA STEEL COMPANY, *San Francisco*
NATIONAL TUBE COMPANY, *Pittsburgh*
Scully Steel Products Company, Chicago, *Warehouse Distributors* · United States Steel Export Company, New York

USS

UNITED STATES STEEL

FOOD DEHYDRATION - UNIFORM QUALITY - LOW COST



THE *New Design* PROCTOR FOOD DEHYDRATOR

1. Entirely automatic in operation.
2. Continuous flow of food products through dehydrator.
3. Flexibility for handling different food products.
4. Dehydrating conditions accurately controlled.
5. Minimum use of strategic materials.
6. No trays or trucks required.
7. Low operating costs.
8. Capacity up to 30 tons of raw product per 24 hours, requiring only one man to operate.

PROCTOR & SCHWARTZ • INC • PHILADELPHIA

• RICED, STRIP, JULIENNE, DICED OR CUBED POTATOES • SLICED, DICED AND JULIENNE CARROTS • DICED AND JULIENNE BEETS • DICED TURNIPS • DICED RUTABAGAS • SHREDDED CABBAGE • SWEET POTATOES • MEATS AND OTHER FOODS

Quick, easy tests for qualitative identification of some common white metals and alloys

The following procedures will distinguish among Monel, "S" Monel*, "K" Monel*, Nickel, 30 per cent copper nickel, nickel silver, Inconel*, chromium-iron and chromium-nickel stainless steels, Ni-Resist*, ordinary steel, and cast iron. Before testing, the material should be cleaned with emery cloth or a file to remove dirt, grease or corrosion products, or any metallic coating such as galvanizing.*

Test with a Strong Horseshoe Magnet

1. If the material is strongly magnetic, it may be nickel, ordinary steel, cast iron or chromium-iron stainless steel. Confirm as in Procedure A.

2. If the material is slightly magnetic, it probably is Monel† or cold-worked 18-8 stainless steel with or without molybdenum. Confirm as in Procedure B or heat the specimen in hot water, preferably boiling, and retest with a magnet while hot. If the specimen loses its magnetism when heated it is MONEL.

3. If the material is non-magnetic, it may be copper nickel, nickel silver, "K" Monel, "S" Monel, Inconel, chromium-nickel stainless steel with or without molybdenum, or Ni-Resist. Confirm as in Procedure C.

Procedure A

FOR STRONGLY MAGNETIC MATERIALS

Place a drop of concentrated nitric acid on a cleaned area.

1. If the acid reacts slowly to a pale-green color, the material is NICKEL.

2. If the acid reacts slowly to a brown-black color, the material is either ORDINARY STEEL, LOW-ALLOY STEEL or CAST IRON.

3. If no reaction occurs, the material is CHROMIUM-IRON STAINLESS STEEL.

Procedure B

FOR SLIGHTLY MAGNETIC MATERIALS

Place a drop of concentrated nitric acid on a cleaned area.

1. If the acid reacts to a green-blue color, MONEL is indicated.

2. After reaction has ceased, add one or two drops of water, immerse an iron nail or steel knife blade in the drop and in contact with the test sample. If the nail or knife blade becomes coated with copper, or if a copper deposit appears on the material being tested, the latter is MONEL.

3. If no reaction occurs, the material is heavily cold-worked CHROMIUM-NICKEL STAINLESS STEEL.

Procedure C

FOR NON-MAGNETIC MATERIALS

Place a drop of concentrated nitric acid on a cleaned area.

1. If the acid reacts rapidly to a blue-green color, the material is NICKEL SILVER or COPPER NICKEL.

2. If the acid reacts to a green-blue color, the material is "K" MONEL or "S" MONEL. The form of the material will usually assist in identification since "K" Monel is never cast and "S" Monel is never wrought.

3. If the acid reacts to a brown-black color, the material is NI-RESIST.

4. If no reaction occurs, the material may be either Inconel or chromium-nickel stainless steel with or without molybdenum.

To distinguish between Inconel and the stainless steels:

(a) Place on the sample a few drops of a solution containing 10 gm. of cupric chloride ($CuCl_2 - 2H_2O$) in 100 cc. of concentrated hydrochloric acid and allow it to stand for 2 minutes. Then slowly add a few drops of water, one drop at a time, and finally wash off the solution. If a copper-colored spot remains, the material is CHROMIUM-NICKEL STAINLESS STEEL with or without molybdenum; if an uncolored etched spot remains, the material is INCONEL. Or

(b) Place 1 drop of concentrated hydrochloric acid on a clean surface of the alloy and allow it to react for 1 minute. Then add 1 drop of an acid ferricyanide solution containing 1 per cent by weight of potassium ferricyanide, $K_3Fe(CN)_6$, and 10 per cent by weight of sulfuric acid. If a dark blue color appears quickly, the material is CHROMIUM-NICKEL STAINLESS STEEL with or without molybdenum; if no color develops it is INCONEL.

(c) A distinction may be made between the types 316 and 317 stainless steel, which contain molybdenum, and the chromium-nickel types 302 and 304. The test is made by immersing the alloy in an aqueous solution containing 75 per cent by weight of orthophosphoric acid (H_3PO_4) and 1 to 30 gm. per liter of sodium chloride (common salt) at 140° to 200° F. If the stainless steel does not contain molybdenum (Types 302 or 304) bubbles of hydrogen will begin to form within 30 sec. If the alloy contains molybdenum (Types 316 and 317) bubbles will not form. The quantity of sodium chloride and the testing temperature are not critical within the limits indicated.

*REG. U. S. PAT. OFF.

†This test should be made preferably after cooling the metal with ice water or a freezing mixture, which will increase the magnetic strength and permit easier distinction between Monel and nickel-copper alloys of lower nickel content, e.g., nickel silver.

THE INTERNATIONAL NICKEL COMPANY, INC., 67 WALL STREET, NEW YORK, N. Y.

★ ★ INCO NICKEL ALLOYS ★ ★

MONEL • "K" MONEL • "S" MONEL • "R" MONEL • "KR" MONEL • INCONEL • NICKEL • "Z" NICKEL

Sheet...Strip...Rod...Tubing...Wire...Castings

AN AMERICAN INSTITUTION WORKING WITH AND FOR AMERICA

And you will not be, Uncle Sam. Your resources in manpower kept strong and healthy by the nourishing products of our sacred soil will win ultimate victory. These foods-for-freedom, born on America's fertile farms and ranches, must travel far to reach our "fighting forces" at the front, in camps, war plants, and in homes throughout our land . . . and, most importantly, must arrive uncontaminated with their nutritional values preserved and with shrinkage held to a minimum. To safeguard such foods throughout handling, shipment and storage is vital war work. It is this type of service to which we, at Rhinelander, gladly devote night-and-day effort in the production of protective packaging papers acclaimed as the world's finest.

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PRESIDENT
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FROM THE BEST THAT'S MADE TO THE CHEAPEST THAT'S GOOD

Genuine Greaseproof
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Greaseproof Innerwraps
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Packing Industry Wrappings—and Specialties to order

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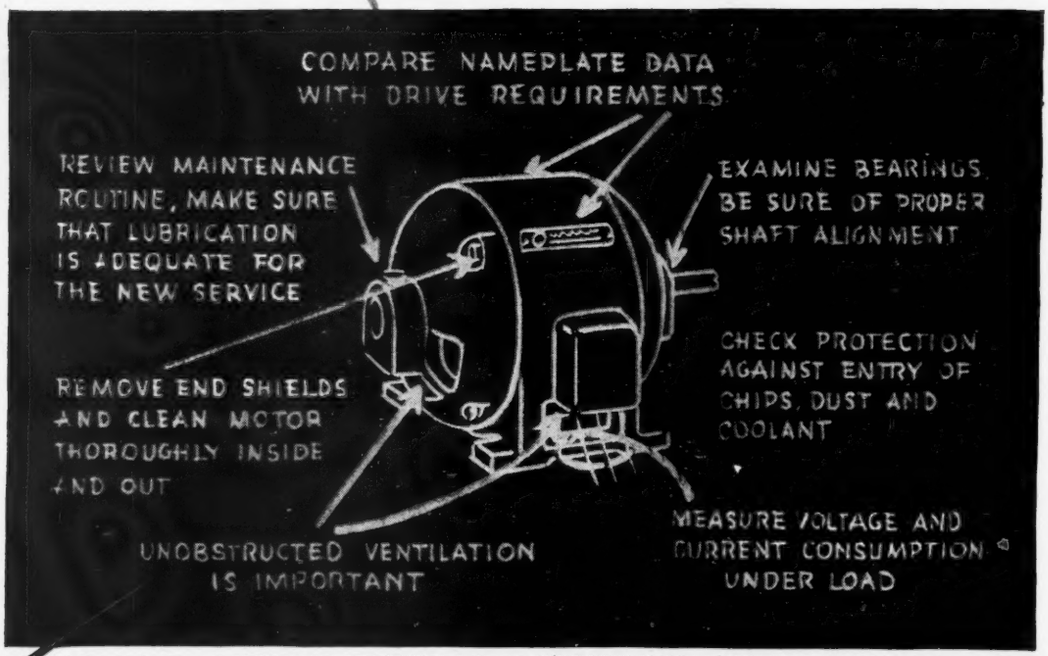
MOTOR CARE

IT'S TIME TO BE A CRANK ABOUT


COMPARE NAMEPLATE DATA WITH DRIVE REQUIREMENTS
REVIEW MAINTENANCE ROUTINE, MAKE SURE THAT LUBRICATION IS ADEQUATE FOR THE NEW SERVICE
EXAMINE BEARINGS. BE SURE OF PROPER SHAFT ALIGNMENT
CHECK PROTECTION AGAINST ENTRY OF CHIPS, DUST AND COOLANT
REMOVE END SHIELDS AND CLEAN MOTOR THOROUGHLY INSIDE AND OUT
UNOBSTRUCTED VENTILATION IS IMPORTANT
MEASURE VOLTAGE AND CURRENT CONSUMPTION UNDER LOAD

protect your production with this maintenance plan

Planned motor maintenance, keyed to today's loads and conditions, saves vital hours of production time by forestalling future breakdowns and delay. In replacing hit-or-miss motor servicing with a regular schedule of trouble-*prevention*, you'll find real help in the G-E *Motor Fitness Manual*.

The check list (right) tells what to do. The *Manual* tells how to do it, using well-proved methods that save time and help assure long-lasting motor service.

And, of course, your local G-E Motor Representative is always ready to aid you in putting these suggestions into practice, or in getting the new motors you may need for essential wartime jobs.

1 Make sure that motors are selected to *match the job*. Install motors so they are properly aligned with the driven load and are easily accessible for regular inspection.

The G-E *Motor Fitness Manual* tells how

2 Keep motors free from dust and dirt. Establish a definite cleaning schedule.

The G-E *Motor Fitness Manual* tells how

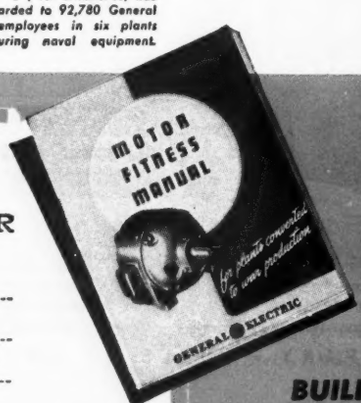
3 Be sure that lubrication is frequent enough to take care of increased production. See that employees are instructed as to proper methods.

The G-E *Motor Fitness Manual* tells how

4 A general overhauling of hard-worked motors will add years to their life. If your motors haven't had an overhaul in the last year, try to arrange your production schedule to permit one.

The G-E *Motor Fitness Manual* tells how

The Navy "E", for Excellence, has been awarded to 92,780 General Electric employees in six plants manufacturing naval equipment.



MOTOR FITNESS MANUAL

. . . for plants converted to war production. Tells what to do to get the most out of motors, old or new. If you're undertaking new work on motor-equipped machines, if you're "switching" motors from one job to another, or equipping machines with new motors, you'll find this bookful of helpful motor facts will save you valuable time. Write for a copy.

General Electric, Sec. A750-171
Schenectady, N. Y.

Yes, send me a copy of your new MOTOR FITNESS MANUAL, GED-1017.

Name.....

Title.....

Company.....

Address.....

City.....

State.....

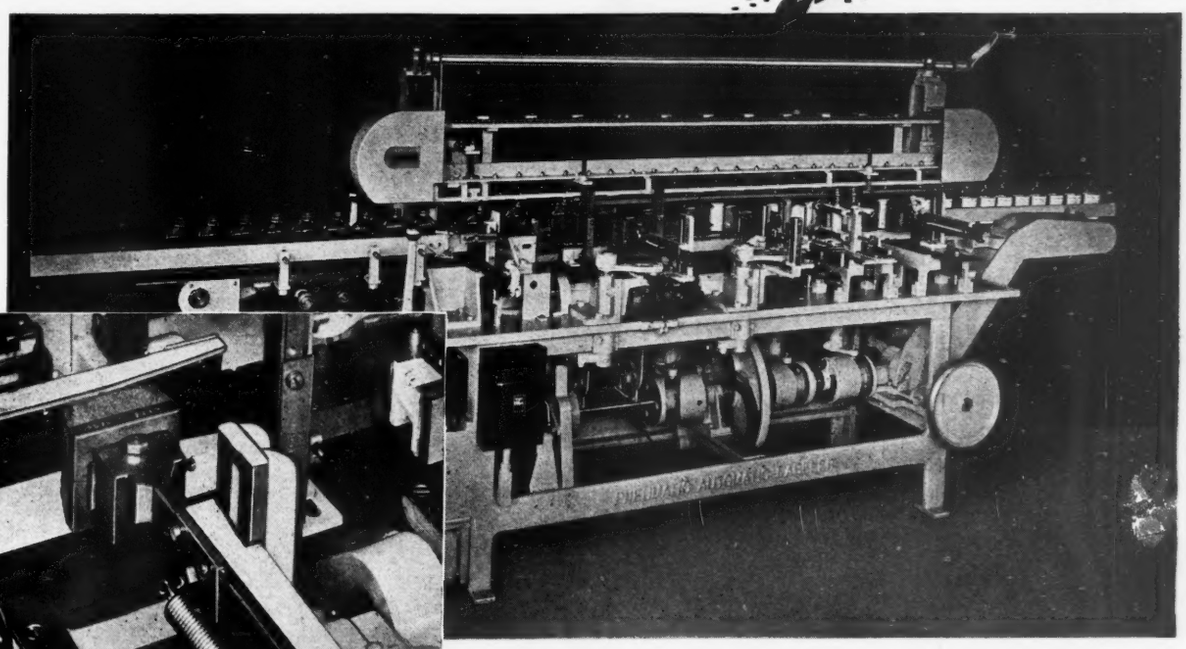
BUILDER OF TRI-CLAD MOTORS

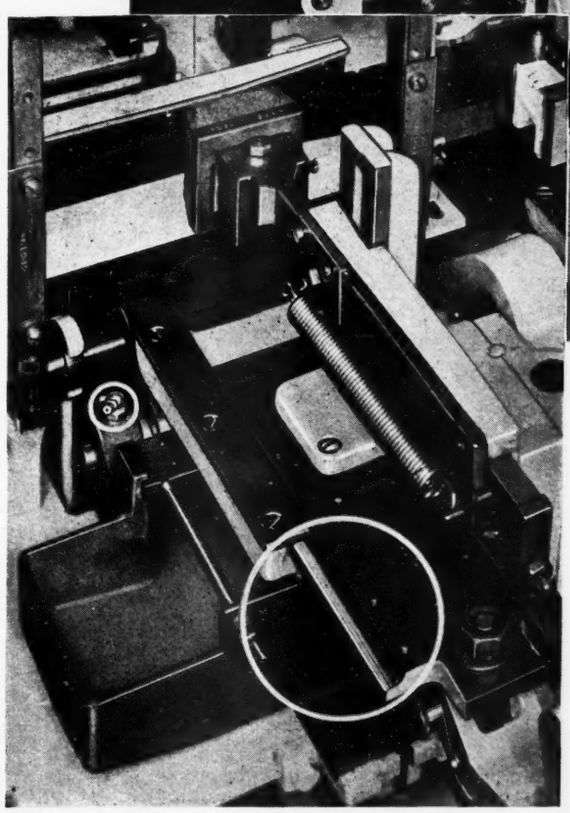
GENERAL ELECTRIC

It's a case where

"OIL & RUBBER DON'T MIX"

says: "SPEED" PRODUCTION "KEEP THEM APART"





"Some things just naturally don't get along together," SPEED says, "and two of them are oil and rubber."

Oil causes rubber to swell, become soft and deteriorate rapidly. So watch the glue station on your Pneumatic labeling machine, where the transfer roll and glue pad are made of rubber. Keep these two things in mind:

Don't use excessive oil on the glue station slide.

Don't put too much grease in bearings supporting the glue pick-up roll.

If these simple precautions are taken, oil and grease won't get into the glue pan and finally onto the rubber roll and pad. Your labels will be applied smoothly and cleanly and you'll be insuring continued, smooth operation of your Pneumatic machines while doing your bit to preserve precious rubber.

PNEUMATIC SCALE CORPORATION, LTD.
91 Newport Avenue, North Quincy, Mass.

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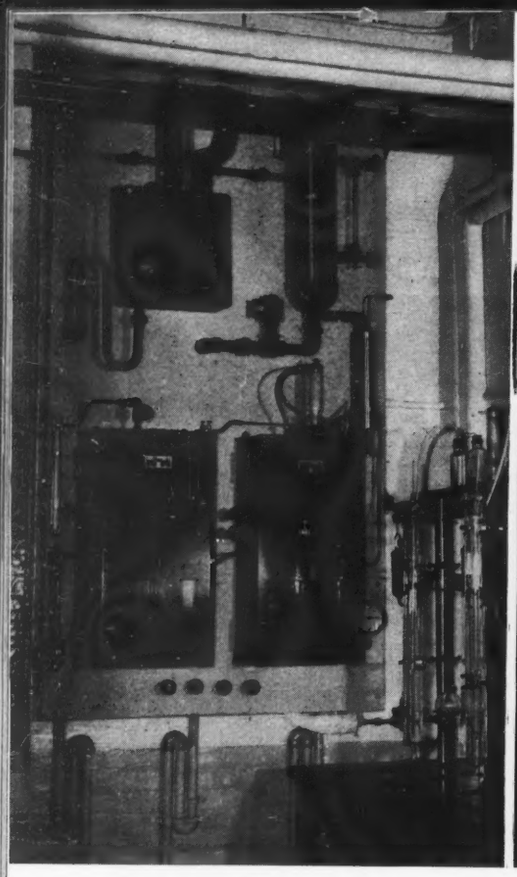
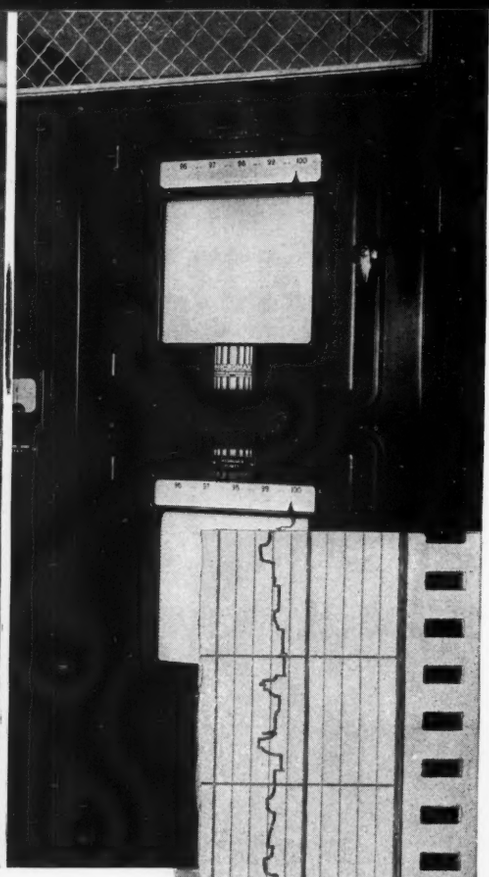


Oxygen and Hydrogen Analysis Cells for Micromax Recorders, in electrolysis-cell house



Micromax O_2 and H_2 Recorders

RECORDING O_2 AND H_2 In Best Foods' Plant

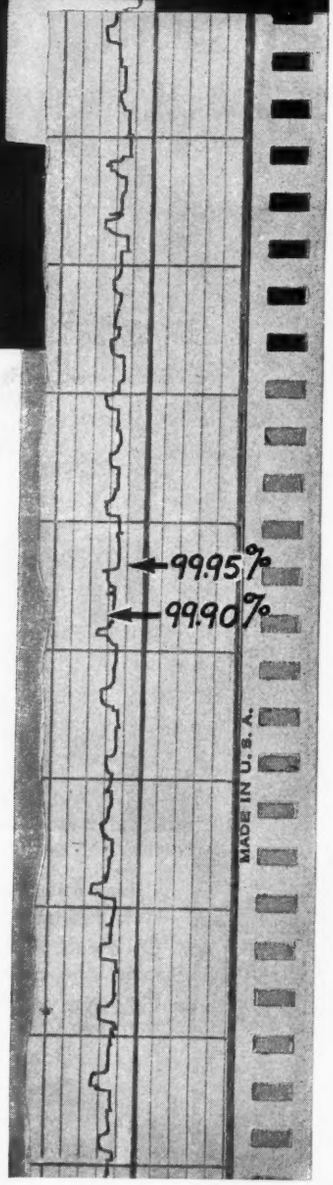
A continuous "picture" of the purity of both oxygen and hydrogen, in the electrolytic gas plant of Best Foods, at Bayonne, is provided by the Micromax recording equipment shown here.

One of the gas-analysis cells and one of the recorders forms the hydrogen analysis equipment; the other cell and recorder are for oxygen.

Hydrogen analysis begins by passing a small continuous stream of the gas from the electrolytic plant through the analysis cell. On the way to the cell, the gas is dried in a pair of tiny towers. The hydrogen recorder measures the percentage of hydrogen as detected by the cell. Its range is 95.5% to 100.5% H_2; the 100% point is thus below from the extreme edge of the chart to facilitate the interpretation of the record at very high purities of gas. The records are extremely accurate and are used constantly by the operators in checking product purity. And, if the recorder ever detects an undesirable concentration of oxygen, it waits for no operator, but yanks open a valve and runs the main hydrogen supply to atmosphere.

The oxygen equipment operates in the same way as the hydrogen, except that the sample gas is saturated instead of being dried, and hydrogen is the impurity which can cause automatic rejection of the gas.

If you desire instrument engineering assistance on a gas-analysis problem, send us the particulars and we will gladly try to help.

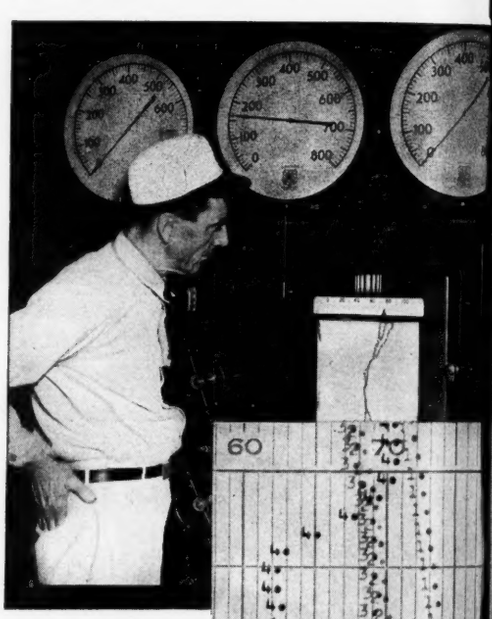


Section of full-size chart from Micromax H_2 Recorder. Note detail shown.

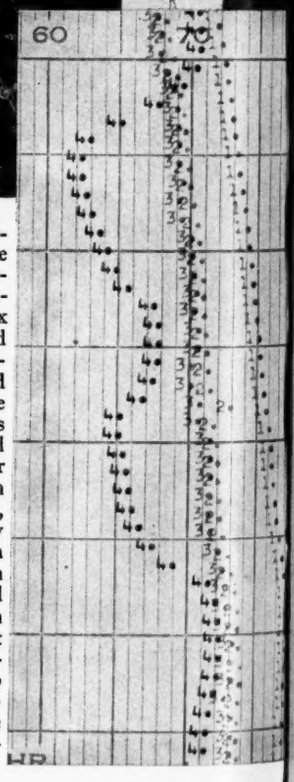
Accurate Volume of Gas Is Easier to Supply When Micromax Helps

Instruments of precision are of course nothing new in the Best Foods' plant; the high standards maintained in manufacture of Nucoa Margarine, Best Foods and Hellmann's Mayonnaise naturally require the constant use of exact measurements. But, nevertheless, some Best Foods technicians recently blinked their eyes when a four-point Micromax Recorder started to show the temperatures of the 30-ft-by-6-ft tanks in which hydrogen is stored at 500 psi pressure.

Though located 250 feet from the tanks, the Micromax was extremely quick in showing the cooling effect of a building shadow, falling across the tanks. And, when some gas was tapped off, the instrument again showed unusual speed in recording the cooling caused by expansion of remaining gas. So, these engineers decided to test one of their fine, high-grade mercury thermometers against the Micromax. They doubted that the test would be entirely fair, but at least it would show Micromax in terms with which they were familiar.



So, they put the thermometer alongside the electrical-resistance thermometer (the Thermohm) of the Micromax equipment. They shaded and exposed the two simultaneously; poured water on them; made other tests. But, try as they would, they could see no difference, in either speed or reading, between the two. And, as a result, they now feel that they get far more information about temperature than they ever had before; and they get this information at the panel, where it helps to control the volume of hydrogen sent to the manufacturing processes, and thus helps the uniformity of the Company's products.



Micromax Gas-Temperature Recorder and portion of full-size record.

Jrl Ad EN-0600B(17)

LEEDS & NORTHRUP COMPANY, 4912 STENTON AVE., PHILA., PA.

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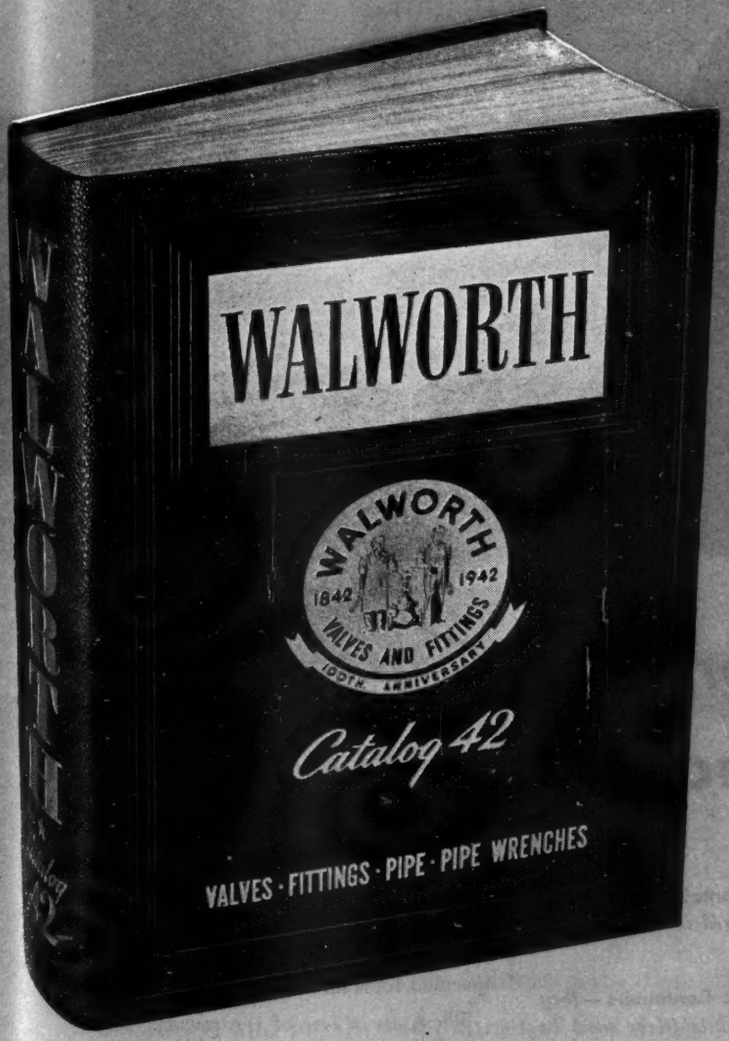
MEASURING INSTRUMENTS · TELEMETERS · AUTOMATIC CONTROLS · HEAT-TREATING FURNACES

Specify FROM THE NEW WALWORTH Catalog 42 and be sure!

HERE'S THE COMPLETE UP-TO-DATE DATA ON VALVES, FITTINGS AND PIPE



1. **METALS** — complete data on all types used including conformity with A.S.T.M., Marine and U. S. Navy specifications.

2. **PRESSURES**—working and test pressures; plus service recommendations.

3. **DIMENSIONS**—complete for layout and operation with cross sections to clarify internal construction.

4. **ENGINEERING DATA** — charts, tables, formulae to make valve and pipe installations easier.

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Your new Walworth Catalog 42 is off the press. Clearly indexed and detailed so as to be most useful, it gives the last word on any question concerning our products.

Priorities on transportation may delay the receipt of your copy but we are doing everything possible to expedite delivery.

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60 EAST 42nd STREET, NEW YORK

VALVES
FITTINGS
and TOOLS
Backed by 100 Years' Service

DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD

Six metal containers dropped into the night

AS THE BOMBING PLANE roared over its objective, six parachute flares were dropped into the night.

Seconds later the target below stood forth . . . bathed in brilliant light.

Great quantities of these flares are required to assure accurate bombing. *And each one is packed in a sturdy metal container.* Parachute flares are merely one example of Canco containers in actual combat . . . another reason why many of you must do without metal containers now.

Other examples include:

Fuse Containers—*hermetically sealed key-opening cans to protect delicate fuses until they are ready for use.*

Emergency Water Containers—*for supplying sterile water used in washing and irrigating wounds.*

Portable Blood Bank Containers—*they protect blood-plasma kits to be used in giving life-saving transfusions in the field.*

Anti-Aircraft Gun Motor Containers—*especially designed to protect delicate motors when not in use.*

Metal First Aid Kits—*hermetically sealed against bacteria and poison gas.*

And numerous others.

We are also producing tremendous quantities of containers for essential foods for the armed forces . . . for the home front, too.

In addition, American Can Company machine shops are devoting a large part of their facilities to the production of specified tools and weapons of war.

These are a few of the reasons why metal containers are not available for some products today . . . reasons why many of you have been forced to adopt substitute packages for the duration.

We are fully aware of the problems you face and are doing everything possible to perfect the manufacture of substitute containers from available materials. Our research efforts are being redoubled to make such containers available for many products in the near future.

American Can Company
230 Park Avenue, New York

If you have Air Conditioning or Refrigerating Equipment that is not engaged in War Work...

★ ★ ★ *OFFER IT TO YOUR COUNTRY NOW!*

We, at York, are turning out for the war effort all the mechanical cooling equipment we can, as fast as we can. *But it is not enough.* It's not enough to furnish American fighters with the ammunition and bombs and motor fuel and rubber and food that they must have... for refrigeration is an essential tool in the manufacture of all these vital war materials, and many more.

We, who for 57 years have urged you to *buy* such equipment, now ask you to *sell* it. York Branch offices throughout the nation are at your disposal to assist in placing your machines where they will make their utmost contribution to Victory. Call the York office nearest you.

York Ice Machinery Corporation,
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YORK REFRIGERATION AND AIR CONDITIONING FOR WAR

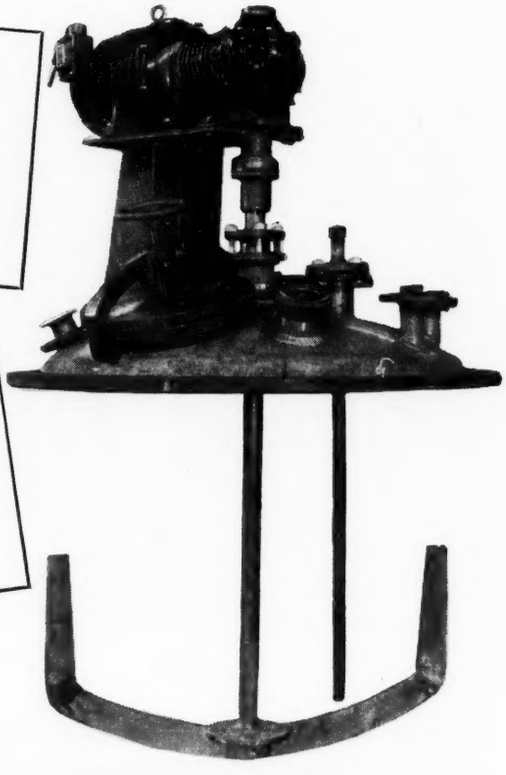
HEADQUARTERS FOR MECHANICAL COOLING SINCE 1885

PATTERSON-KELLEY SPECIALIZES IN

Sanitary Engineering

FOR THE FOOD INDUSTRY

Patterson-Kelley Steam Jacketed Mixer. Constructed of non-ferrous metal, with steel jackets, for a steam working pressure of 125# and a 30" shell vacuum.



Mixing mechanism and top head completely removable as a single unit. Permits thorough cleaning. Anchor type agitator.

Sanitation is as important in the design of food equipment as efficient performance. This sturdy Patterson-Kelley mixer gives you the benefit of both. The head and anchor type agitator can be removed from the shell as a single unit. A simple operation that permits thorough cleaning in the shortest possible time.

Made of the finest materials, the mixer combines precision engineering with durable construction. It is typical of the excellent workmanship of Patterson-Kelley kettles, cookers, dryers, dehydrators and heat exchange units. These units may be fabricated from a wide range of metals to meet the most exacting requirements of the food industry.

Patterson-Kelley will be glad to consult with you on your equipment problems—at no obligation to you. Write today for your free copy of the Patterson-Kelley Chemical and Process Equipment Catalog.

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PATTERSON-KELLEY HEAT EXCHANGE ENGINEERS

THE *Patterson-Kelley* CO., INC.

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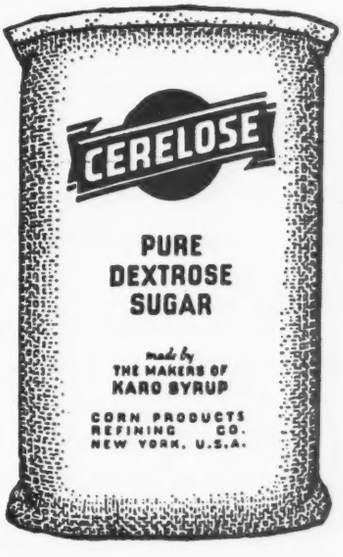
MANUFACTURERS FOR THE FOOD AND PROCESS INDUSTRIES

Best of Everything for Him

FIRST responsibility of the food industry is to see that our armed forces get all they need—of the best our country affords.

In re-adjusting food processing to meet wartime demands, it was inevitable that some shortages would develop. And since Dextrose is so widely used to enhance food value and to improve the flavor and texture of a great variety of food products, it is only natural that the supply of Cerelose, pure Dextrose sugar, should be affected.

While this shortage is temporary, the value of Cerelose is permanent. Its merit as a standard ingredient in food products, remains as always, unchanged.



CORN PRODUCTS SALES COMPANY

17 Battery Place • New York, N. Y.

CERELOSE *pure* DEXTROSE

MERCK CONTRIBUTIONS IN THE VITAMIN FIELD

1934 *Ascorbic Acid Merck (U.S.P.) was made available.*

1936 *Vitamin B_1 was synthesized in the Merck Research Laboratories.*

1937 *Vitamin B_1 Merck (Thiamine Hydrochloride U.S.P.) was made available.*

1938 *Niacin Merck (Nicotinic Acid U.S.P.) and Niacinamide Merck (Nicotinamide) were made available.*

1938 *Riboflavin Merck (Vitamin B_2) was made available.*

1938 *Alpha-Tocopherol (Vitamin E) was identified and synthesized by Merck chemists and their collaborators in other laboratories.*

1939 *Vitamin B_6 was synthesized in the Merck Research Laboratories.*

1940 *Pyridoxine Hydrochloride Merck (Vitamin B_6 Hydrochloride) was made available.*

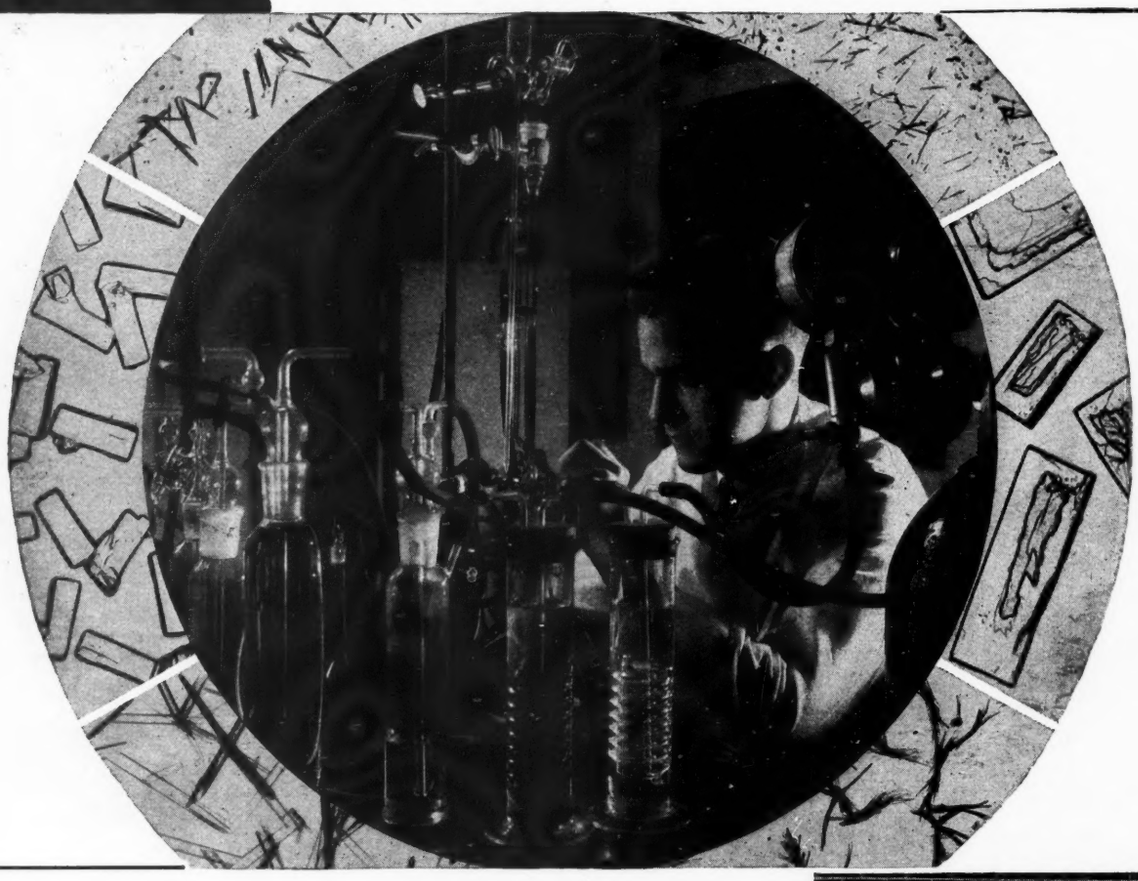
1940 *Alpha-Tocopherol Merck (Vitamin E) was made available.*

1940 *Vitamin K_1 Merck (2-Methyl-3-Phytyl-1, 4-Naphthoquinone) was made available.*

1940 *Menadione Merck (2-Methyl-Naphthoquinone) (Vitamin K Active) was made available.*

1940 *Pantothenic Acid (Member of B Complex) was identified and synthesized by Merck chemists and their collaborators in other laboratories.*

1940 *Calcium Pantothenate Dextrorotatory Merck was made available.*

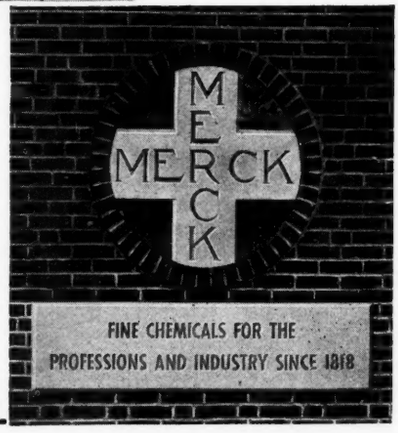


AS the foremost manufacturer of pure vitamins, Merck & Co. Inc. offers the food processor an established and dependable source of these vitally important substances.

Backed by thorough experience, extensive resources, modern and rapidly-expanding production facilities, Merck is well qualified to serve food processors who are preparing to improve their products through the addition of pure vitamins.

The illustrated brochure, VITAMINS IN NUTRITION, will be mailed on request.

For Victory—Buy War Savings Bonds and Stamps



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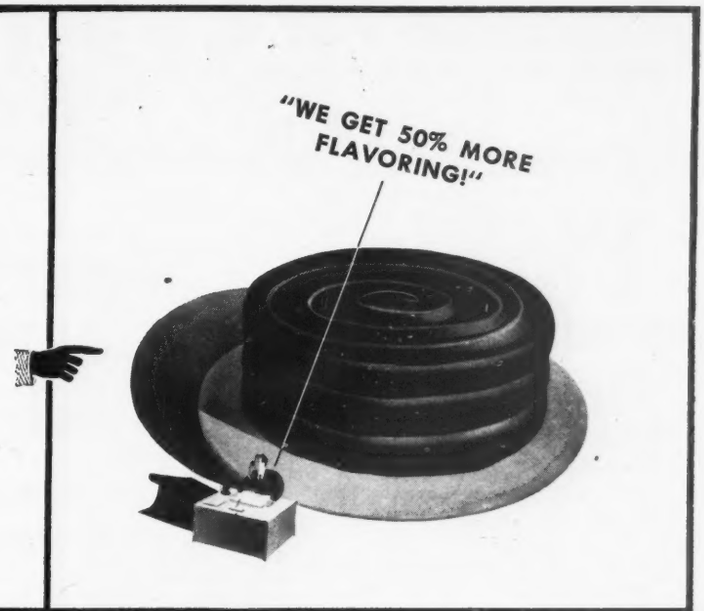
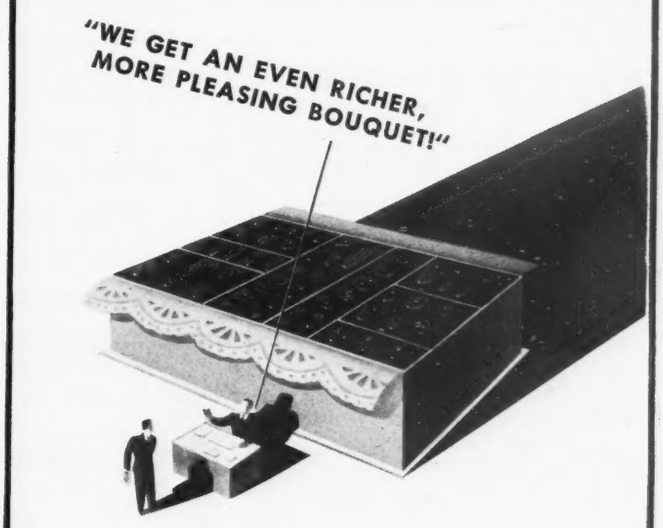
SINCE WE CHANGED TO ETHAVAN...





THERE is good reason for the swing to Ethavan. Food, confectionery and extract manufacturers alike are finding this high quality ethyl vanillin an excellent solution to wartime vanilla-flavoring shortages...and an excellent way to cut costs and improve the sales appeal of their products.

One large manufacturer reports that Ethavan gives him 3½ times the flavoring strength of vanillin in his formula... making it possible to increase production 50% with just half as much Ethavan as vanillin at a 33% reduction in flavoring cost!

You may or may not be able to equal those results in your product. Depending on the type of food product to be flavored, most users report that Ethavan has a relative flavoring strength three times that of vanillin. But even at lower ratios you will be able to increase your production per pound of flavoring material used and make substantial savings in cost.

You may also be able to improve your finished product! Fully equal to Vanillin Monsanto in uniform high quality, Ethavan has a pronounced and pleasing aroma which imparts a highly desirable added bouquet to the finished flavor.

Although supplies of Ethavan are definitely limited, raw material scarcities thus far have not affected this product as much as many others, and every effort consistent with the Victory program will be made to continue production at present levels. MONSANTO CHEMICAL COMPANY, Organic Chemicals Division, St. Louis, Missouri. District Offices: New York, Chicago, Boston, Detroit, Charlotte, Birmingham, Los Angeles, San Francisco, Montreal.

ETHYL VANILLIN IN FEDERAL SPECIFICATIONS

Ethyl vanillin is now included in Army and Navy Specifications for imitation vanilla flavors. See "Federal Specifications EE-E-911a; Extracts, Flavoring; and Flavors, non-Alcoholic (September 22, 1941)" available from U. S. Government Printing Office, Washington, D. C.

MONSANTO
CHEMICALS
SERVING INDUSTRY...WHICH SERVES MANKIND

MATERIALS
FOR THE FOOD MANUFACTURER

VioBin

THE NATURAL SOURCE OF VITAMIN B COMPLEX

VioBin

- is stabilized Wheat Germ.
- has palatable Nutty flavor.
- is guaranteed to keep perfectly for at least three years.
- is richer in "B" complex than wheat germ from which it is derived.

If you are interested in fortifying foods with the "B" complex, write for complete information.

VioBin Wheat Germ Oil

completely stable for one year; tocopherol content 4 milligrams per gram. Samples from every "run" placed under bond to sustain these claims.

VIOBIN CORPORATION

36 Oak St., Monticello, Ill.
VioBin (Canada) Ltd., 637 Craig St., West, Montreal, Quebec

HYDROLYZED VEGETABLE PROTEIN USERS—

we think we can help you!

WRITE FOR DETAILS TO
Food Specialties Dept.

STANDARD BRANDS
Incorporated
595 Madison Avenue
New York, N. Y.

SH EST. 1866 *High Quality* and **UNIFORMITY** In Our Brands of...

Tapioca Flour	Rice Starch
Pearl Tapioca	Potato Starch
Egg Albumen	Rice Flour
Egg Yolk	Potato Flour
Stabilizers	Soya Bean Flour
Corn Starch	Vegetable Gums

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Pure Food Dextrines

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A. P. CALLAHAN & COMPANY
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CHICAGO, ILL.

Why does CARROT OIL make foods golden yellow?

Because carrot oil contains carotene. Carrot oil is extracted from carrots, and each pound contains up to 25 million units of carotene, the international standard of vitamin A.

Carrot oil is preferred for vitaminizing foods because it is a natural vegetable oil, and because it contributes vitamin A of high stability and desirable golden yellow color.

Carrot oil is not synthetic, does not contain animal fats of any kind, and does not produce fishy flavor.

Also producers of ThiaBee, a stabilized wheat germ product rich in Vitamin B_1.
These vitamin products are of particular interest to all manufacturers of food products.
Inquiries are invited. Literature, prices and samples to firms requesting same on their letterheads.

NUTRITIONAL RESEARCH ASSOCIATES, INC.
201 Broad Street,
South Whitley, Indiana

HYDROLYZED VEGETABLE PROTEIN
▼
MONO-SODIUM GLUTAMATE

THE HURON MILLING CO.
9 PARK PLACE
NEW YORK, N.Y.
IN BUSINESS OVER 70 YEARS

New Advertisements
must be received by December 18th to appear in the January issue.

Address copy to
DEPARTMENTAL STAFF
FOOD INDUSTRIES
330 West 42nd St., New York City

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WHERE TO STORE FROZEN FOODS

QUAKER CITY COLD STORAGE CO.
PHILADELPHIA, PA.
3 WAREHOUSES 3
Proper Temperature For Frozen Foods

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Featuring additional Equipment Materials and Supplies for the Food Processing Industries

CANNING MACHINERY FOR FRUITS · VEGETABLES · FISH · ETC.
A. K. ROBINS & CO. INC. BALTIMORE, MD.
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Extend Flavor with SPICEOLATES

D&O "SOLUBILIZED" SPICE OIL FLAVORS

SPICEOLATES help you solve one of today's big supply problems resulting from governmental restrictions on the use of spice oils. Use SPICEOLATES to great advantage in stretching your supply of natural spice oils and also, to replace dry spices now used in your formulas.

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180 VARICK STREET • NEW YORK, N.Y.

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Plant and Laboratories: Bayonne, N. J.

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SALT
CEREAL AND GRAINS
CHOCOLATE PRODUCTS
MILK PRODUCTS

ARE JUST SOME of the materials on which JEFFREY-TRAYLOR DRYING AND COOLING equipment has been applied.

• • •

Perhaps there is a material you want conveyed at an automatically-controlled rate through various processing zones, to be dried or cooled on the way. Jeffrey-Traylor drying and cooling systems employ high-frequency vibration under absolute control — handle friable, gaseous or pure materials without contamination, breakage or loss of color or lustre — direct and indirect types.

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Color that says

"THE FLAVOR'S THERE"

Before they buy, they anticipate the taste with their eyes. Having exactly the right color—always uniform — is the best way to capture customer interest.

National's U. S. Government Certified Colors . . . the food industry's oldest and most complete line . . . includes every Primary Color and Blend to meet your requirements of shade, strength and uniformity.

National Technical Service welcomes the opportunity to give you constructive help in solving your color problems with exactly the right shades for maximum sales appeal. Your inquiry is invited.

Certified Food Color Division

NATIONAL ANILINE DIVISION

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BOSTON PHILADELPHIA GREENSBORO CHATTANOOGA
PROVIDENCE SAN FRANCISCO ATLANTA PORTLAND, ORE.
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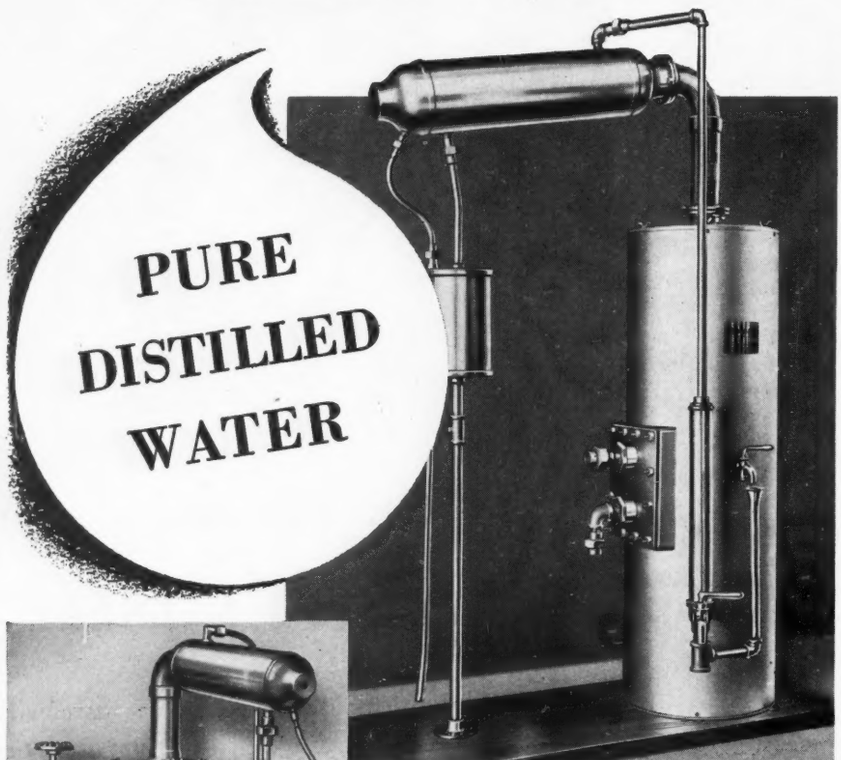
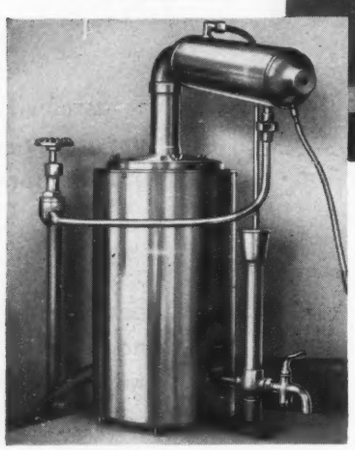
Give Your Control Lab a STEADY DIET of

PURE DISTILLED WATER





Barnstead Water Still, installed in the H. J. Heinz Company, Medina, N. Y. laboratories.

Control labs in food plants need pure distilled water. ***But what is more important,*** these labs need water that is consistently pure day after day, year after year. For variables breed trouble—they upset the efforts of careful research.

Some of the most prominent names in the food industry have found their answer to this problem in Barnstead water stills. For these stills—the steam, gas, or electrically operated stills, ranging from ½ to 500 gallons per hour—produce a distillate that *is* consistently pure through days, months, years—***even as long as twenty years.***

SOME OF THOSE USING BARNSTEAD WATER STILLS

Armour & Co., South City, Ia., etc.
Baker, Walter Co., Dorchester, Mass.
Battle Creek Food Co., Battle Creek, Mich.
Borden's Condensed Milk Company, N. Y.
Canada Dry Ginger Ale, Inc., Hudson, N. Y.
Diamond Salt Co., St. Clair, Mich.
Hecker H-O Co., Inc., Buffalo
Heinz, H. J. Co., Pittsburgh, Pa., etc.
Hood, H. P. & Sons, Charlestown, Mass.
Loose-Wiles Biscuit Co., Long Island City, N. Y.
National Biscuit Co., New York
Pillsbury Flour Mills Co., Minneapolis, Minn.

Barnstead STILL & STERILIZER CO. Inc.

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NEW YORK, N. Y.

MACHINES MAKE BETTER GLASS

. . . when men like this run them

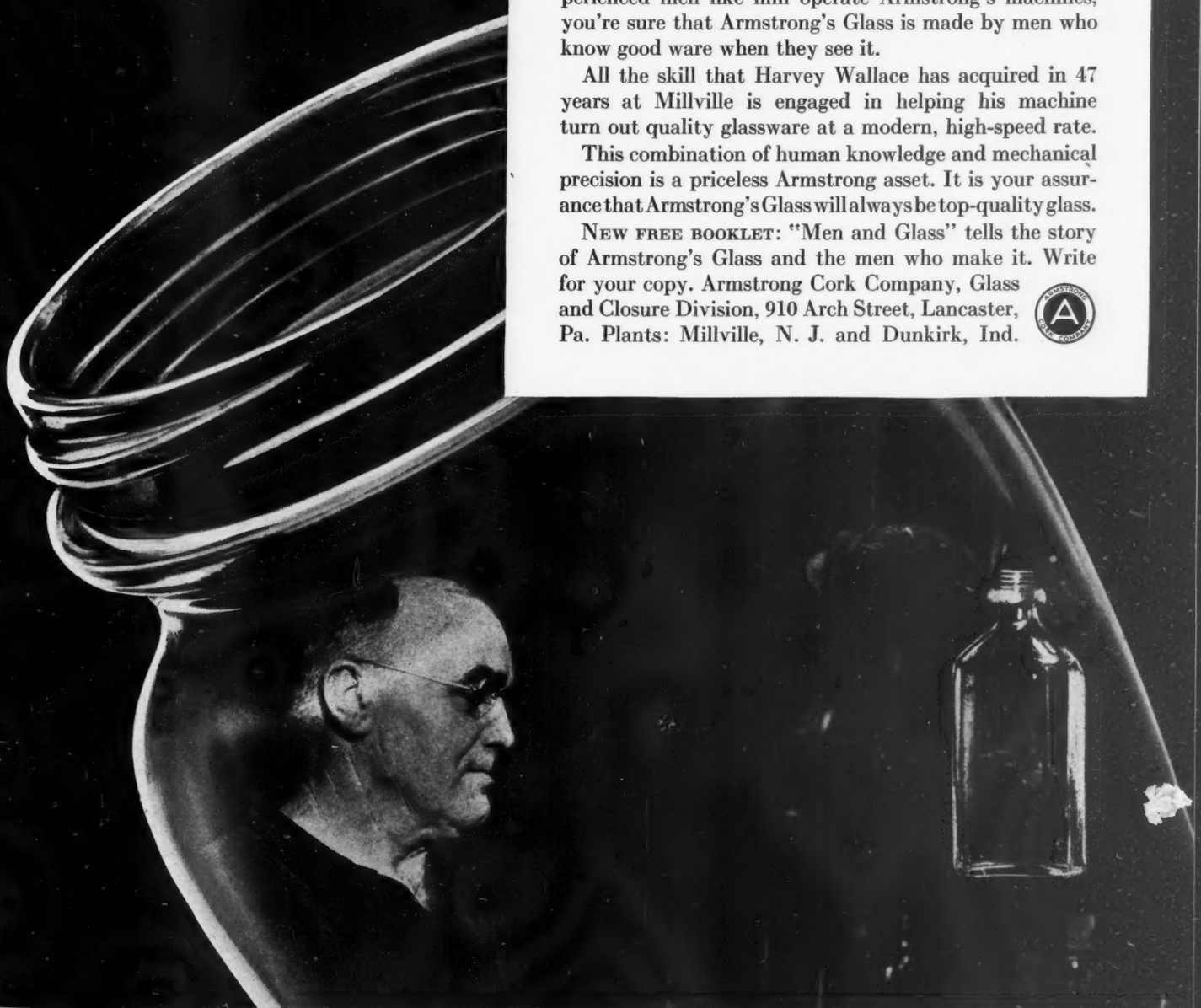
THIS IS Harvey Wallace. Years ago, he was a member of one of the most difficult and highly skilled professions in the world. He was a glass blower at Armstrong's Millville, New Jersey Plant.

Today, Armstrong's Glass is blown by mechanical lungs. And because Harvey Wallace and other experienced men like him operate Armstrong's machines, you're sure that Armstrong's Glass is made by men who know good ware when they see it.

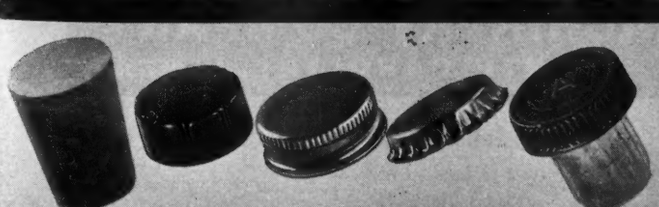
All the skill that Harvey Wallace has acquired in 47 years at Millville is engaged in helping his machine turn out quality glassware at a modern, high-speed rate.

This combination of human knowledge and mechanical precision is a priceless Armstrong asset. It is your assurance that Armstrong's Glass will always be top-quality glass.

NEW FREE BOOKLET: "Men and Glass" tells the story of Armstrong's Glass and the men who make it. Write for your copy. Armstrong Cork Company, Glass and Closure Division, 910 Arch Street, Lancaster, Pa. Plants: Millville, N. J. and Dunkirk, Ind.

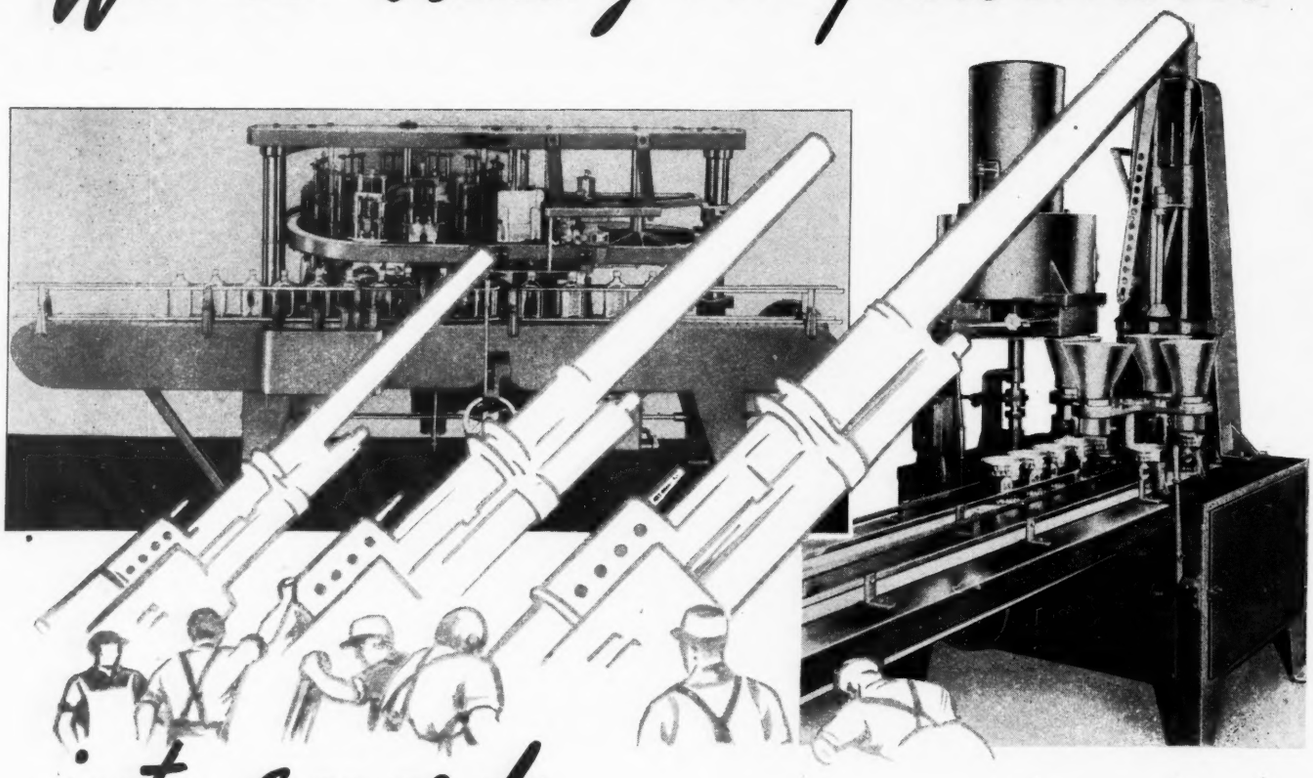


ARMSTRONG'S GLASS



and ARMSTRONG'S CLOSURES

We are beating our plowshares



into swords

In effect, the above illustrates what is happening—already has happened —at Wright's . . .

". . . about 100% on war work," states Mr. R. H. Wright, Vice-President.

"*But,* we are able to take care of all essential repairs.". . . In fact, Wright brains and ingenuity are not frozen at all. We can promise you big things to come—after we have *finished* the immediate job at hand.

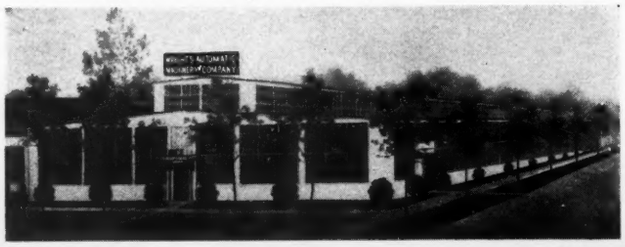
In the meantime we are at your command to help keep your present equipment functioning efficiently. Your present Wright equipment will easily outlast this war if given proper care.

We suggest putting new equipment reserves into War Bonds—later to buy the latest, most efficient new equipment that experience and research can produce.

EVERY PAY DAY

Wright's more than 700 employees are signed 100%—are contributing 12.6% of total salaries and payroll.

ESTABLISHED • 1893 •



PACKAGING ENGINEERS

WRIGHT'S AUTOMATIC MACHINERY COMPANY

DURHAM CABLE ADDRESS YONWRIGHT NORTH CAROLINA, U. S. A.

"Our Best Salesman!"
Looks like a machine. It is a machine ... an automatic machine that swiftly shapes and seals Bemis Deltaseal Paper Bags. It is a salesman, too, for the bags it packs have substantially increased sales for the products they carry.
Bemis Deltaseal Paper Bags are quick to win retailer support. Their colorful brand printing adds eye appeal. Their square ends and sides make them easy to stack on shelves or in mass displays. Their pouring spout wins consumers' preference. Many a product that had been consigned to a corner, wins choice display positions when packed in Bemis Deltaseal Paper Bags.
BEMIS
Deltaseal
BAGS
PULL
CUT
POUR

BEMIS BRO. BAG CO.

Headquarters for the

DELTASEAL System of PACKAGING

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OFFICES: Baltimore • Boston • Brooklyn • Buffalo • Charlotte • Chicago • Denver • Detroit • E. Pepperell • Houston • Indianapolis • Kansas City • Los Angeles • Louisville • Memphis • New Orleans • New York City • Norfolk • Oklahoma City • Omaha • Peoria • St. Louis • Salina • Salt Lake City • San Francisco • Seattle • Wichita

WARTIME PACKAGING *by Menasha*

Over-wrapped Cigarette Carton for Overseas Shipment
Cartridge Carton
Ration K Package with Heat-Sealed Over-Wrap
Food Concentrate Carton for Ration K Package
Cartridge Clip
Heat-Sealing Bag for Moist or Liquid Content Frozen Foods
Heat-Sealing Ration K Bag

COVERS THREE PACKAGE TYPES

Does your problem involve a Carton? Bag? Over-Wrap? Does it involve a combination of two or of all three types? Here at Menasha our wartime service to packagers embraces all the fields.

CARTONS

Special paperboards, special construction and above all, special protection —these are factors in choosing cartons for wartime packaging. Menasha's resources and experience in carton manufacture are at your call for designing and planning carton packaging. Our production today includes cartons for cartridges, cartridge clips, dehydrated eggs and other dried foods, frozen foods, Ration K and many another direct-war product.

BAGS

Menasha pioneered the completely protective heat-sealed bag. Today our special bag machinery is producing protective bags for a variety of war products—Ration K, dehydrated eggs and other dried foods, frozen foods, concentrates, powders and many other vital products. The same fine protection is of interest to producers of drugs and medical products, surgical instruments, precision-machined parts and a wide range of war products requiring protective transit and storage.

OVER-WRAPS

Today's shipping requirements demand the protection of over-wraps. Here again Menasha's long experience is an asset to producers seeking the answer to war packaging. Our production includes over-wraps for metal parts, tobaccos and cigarettes for overseas, dehydrated eggs and other dried foods, Ration K, frozen foods and many another hard-to-keep wartime product.

SEND US YOUR PACKAGING PROBLEMS: A skilled staff of packaging technicians, package designers will devote their combined experience to your special problem.

WAR PRODUCTS DIVISION

THE MENASHA PRODUCTS CO. MENASHA, WISCONSIN

Division of Marathon Paper Mills Co.

MENASHA *Menasha* PRODUCTS

There's no 5 o'clock whistle

. . . WITH A ZERO ON YOUR TAIL

★

THROW YOUR SCRAP
INTO THE FIGHT

★

Whistling, whining bullets from a Jap Zero or from Berlin's anti-aircraft defenses are no quitting signal for our big bombers and their fighter escorts. Our Axis-smashing flyers are pressing on to Victory. And to give them every possible advantage, plane motors are "super-charged;" high altitude air is compressed to sea-level density so that even "35,000 feet upstairs" motors function perfectly. ★ A vital part of this all-important supercharger is the *lubricating pump* . . . lubricating pumps such as are coming from Universal Cooler's "precision production" lines by the thousands. ★ Other war-time jobs at Universal Cooler include hydraulic mechanisms for directing artillery fire, cooling equipment for machine guns and refrigerating units for the Army, Navy and Marines. New skills and experiences thus gained point to "things to come" in the commercial refrigeration field when Victory is won.

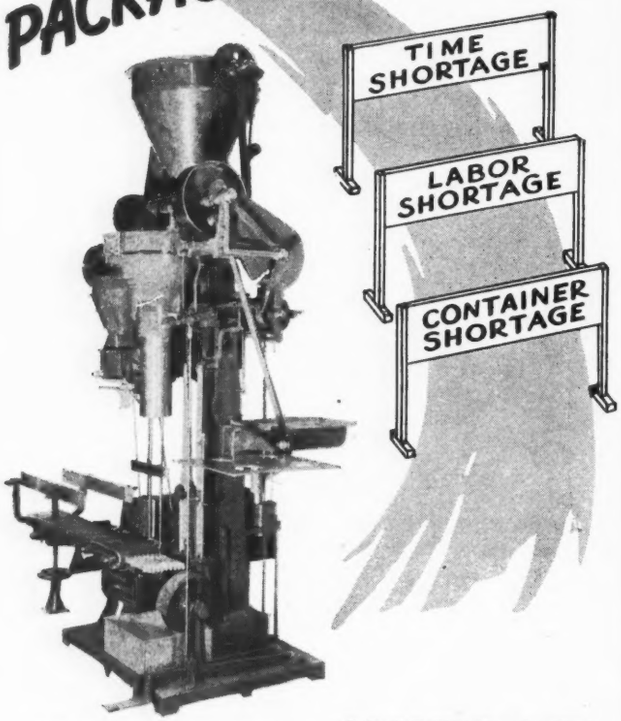
UNIVERSAL COOLER

UNIVERSAL COOLER — WE SELL TO MANUFACTURERS ONLY

UNIVERSAL COOLER CORPORATION • Automatic Refrigeration since 1922

MARION, OHIO • BRANTFORD, ONTARIO

TRIANGLE PACKAGE MACHINERY



Will Help You HURDLE Wartime Shortages!

TRIANGLE Package Machinery will aid you and aid the war effort in the following ways:

1. Make possible changeover from containers made of critical materials to cartons and bags.

2. Save labor to meet the manpower shortage. As much as 60% and more labor saving reported by Triangle users.

3. Save time—you deliver the goods sooner.

4. Increase production—more output, often in less space.

A complete line of Weighers, Fillers, Carton Sealers.

Write today for literature and data on machines to handle your job.

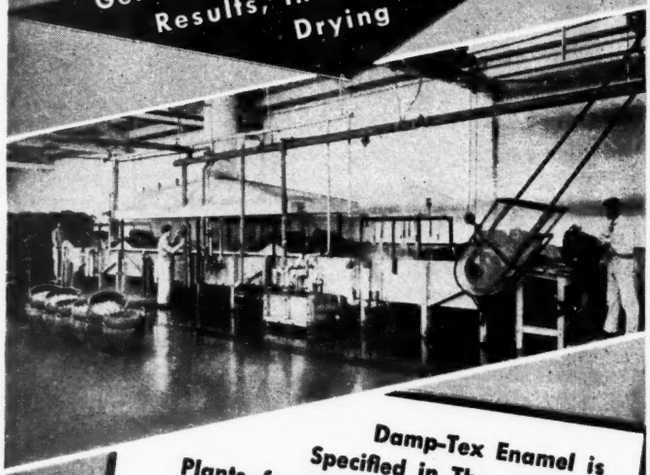
TRIANGLE PACKAGE MACHINERY CO.

922 NO. SPAULDING AVENUE, CHICAGO

BRANCHES IN PRINCIPAL CITIES

PAINT PROTECT BEAUTIFY WALLS AND EQUIPMENT WHILE THEY'RE WET

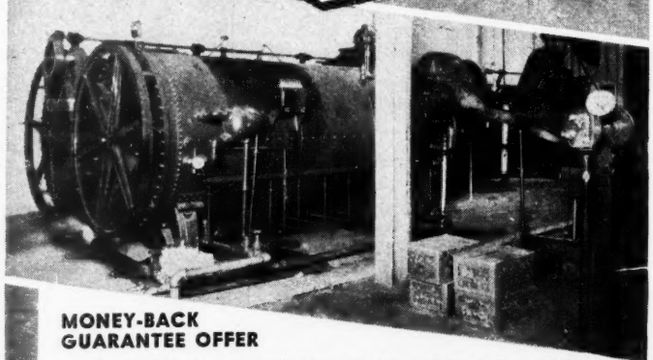
Get Dry Surface Results, Including Quick Drying



Damp-Tex Enamel is Specified in Thousands of Plants for Wet Surface Maintenance

1. Damp-Tex Enamel sticks to any wet surface. Helps force out moisture. Then dries into a tough waterproof film that stops deterioration.
2. Contains no flavor tainting odor.
3. Resists oxidation, corrosive gases. Will not crack, blister, check or peel.
4. One coat covers. One gallon covers 450 square feet of wood or metal surface, 360 square feet of cement, brick, or porous surface, wet or dry.
5. Dries in a few hours. Comes in white and colors.
6. Can be washed repeatedly.
7. Eliminates bacterial and fungus growth.*

*Pre-treated DAMP-TEX 10c per gallon extra



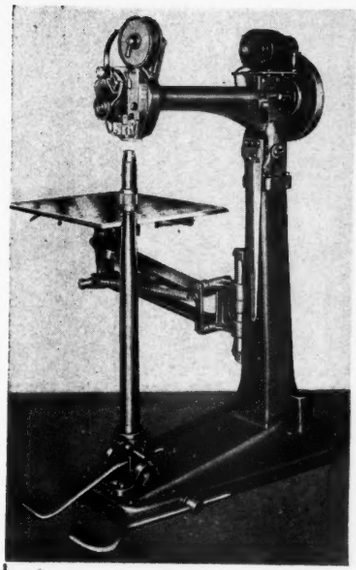
MONEY-BACK GUARANTEE OFFER

On your initial order we will ship one gallon of Damp-Tex at $4.95 or five gallons or more at $4.85 per gallon. Freight allowed on orders of 5 gallons or more. Points west of Rockies add 25c per gallon.

We guarantee that when applied according to directions, Damp-Tex will do everything we claim for it, or upon notification we will give you shipping instructions for unused balance, and cancel charge for amount used, or if paid for, money will be refunded.

DAMP-TEX The Enamel Made Expressly for Wet Surfaces

STEELCOTE MFG. CO., SAINT LOUIS, MO.



Set Up for Bottom Stitching

BLISS TOP and BOTTOM STITCHER

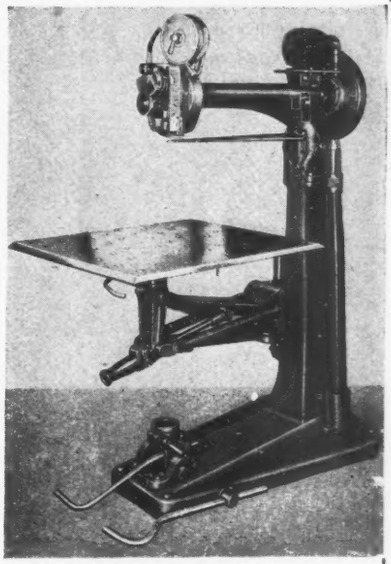
Containers with both tops and bottoms wire stitched are now specified for packing numerous products.

This combination BLISS TOP and BOTTOM STITCHER is recommended for plants whose production does not warrant installation of separate Bottom and Top Stitchers. For assembling cases by bottom stitching, the blade anvil is dropped down against the pedestal and the table is swung to one side as illustrated at left; the post is placed in a socket on the base and locked in position.

After the desired number of containers has been bottom stitched, the post is removed and table and blade anvil swung into position as illustrated at right, for top stitching the filled containers. Less than one minute is required to make the change.

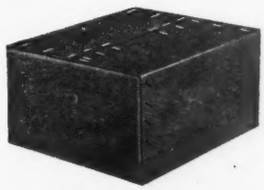
The work table is fitted with ball bearings on which the box may be easily moved in any direction. The table is counter-balanced and is quickly and easily adjustable up or down by hand for boxes of varying heights.

Built in two sizes with 15" and 25" throats, and 26" x 30" work table. Handles boxes up to 25" in depth. The standard Heavy Duty Stitcher Head is used. Motor ¾ HP.



Set Up for Top Stitching

Wire stitching both top and bottom provides a uniformly secure closure and gives added strength and rigidity to the case.



Write for further information

DEXTER FOLDER COMPANY

330 West 42nd Street — **New York, N. Y.**

Chicago • Boston • Philadelphia • Cincinnati

Uniform SPEED For EVERY PROCESS
LOOK FOR IMPRINT "LA PORTE" IN METAL TO BE SURE IT'S A LA PORTE
LA PORTE
FLEXIBLE STEEL CONVEYOR BELTING

It's Stretchless • Slipless • Longwearing

Constant pulley speeds are maintained in LA PORTE Conveyor Belting, because it does not stretch, slip, weave, creep nor jump. This assures a more uniform handling of products in process from the grading table to the shipping room. The open mesh feature permits the circulation of air, heat, and water around products in process, and facilitates sterilizing with steam gun or scalding water without removing belt from pulley stands. In addition, its perfectly flat surface provides for conveying all types of containers empty or filled.

LA PORTE Flexible Steel Conveyor Belting will stand up under heavy loads, resists loading impacts and gives longer, more efficient service at lower cost.

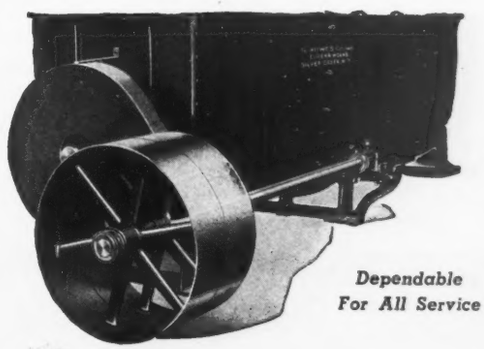
Ask your Mill Supply House for LA PORTE Conveyor Belting in galvanized steel—available in any length and practically any width.

The LA PORTE MAT & MFG. CO.

BOX 124 — **LA PORTE, INDIANA**

EUREKA

America's Best



Dependable For All Service

Precision Action

Concentrates Mixer

Simple mastery of all pre-mixing . . . Rapid '4-motions intermingling that insures unfailing mixing—at large capacity—at small expense for power and labor's attention . . . Master designed, superbuilt outfits that perform perfect service with unfailing regularity . . . Made in several sizes

Ask for Catalog I-165

S. HOWES CO., INC., Silver Creek, N. Y.

CELLOPHANE PROTECTS U. S. ARMY FIELD RATIONS

THE U. S. ARMY Quartermaster Corps uses Cellophane for many of the field food rations issued to soldiers.

These compact, energy-giving foods of various types are scientifically selected for a balanced diet, and they must be scientifically packaged to keep in perfect condition, winter or summer, rain or shine, jungle or desert. Cellophane helps protect the freshness and nutrition of these special rations under the most severe field conditions.

In addition to protecting U. S. Army food ration units, some of which are illustrated below, the Government is finding many other vital wartime uses for Cellophane, which require substantial quantities of our product.

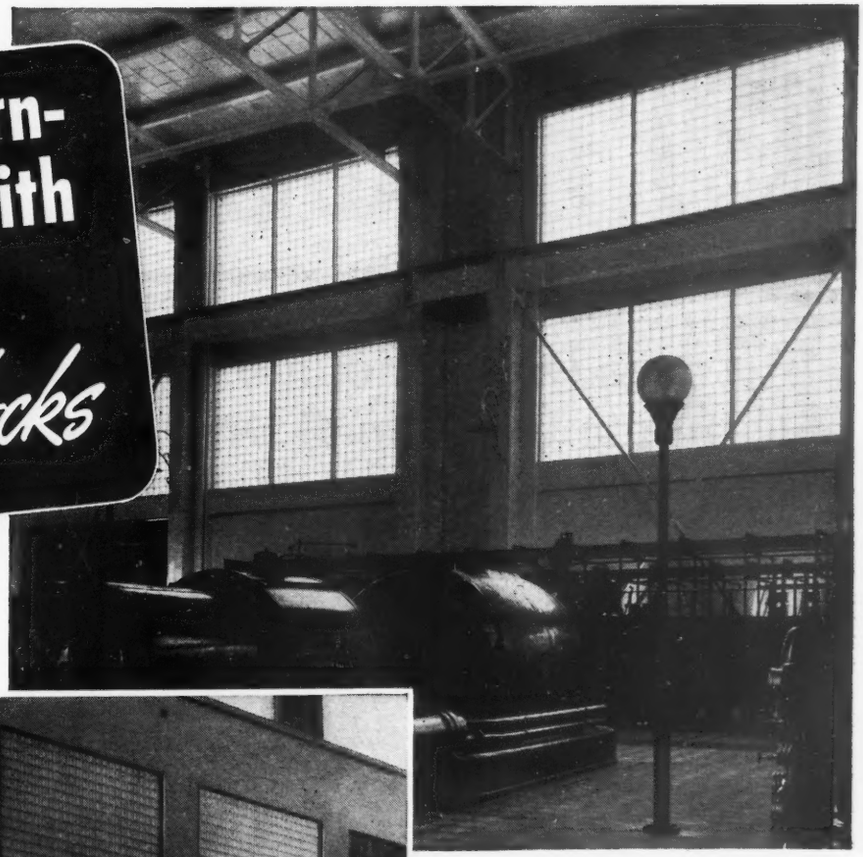
All this is added testimony to the value of Cellophane as a protective wrap.

DU PONT
REG. U. S. PAT. OFF.
Cellophane

E. I. du Pont de Nemours & Co. (Inc.)
Cellophane Division, Wilmington, Delaware

UNITS OF U. S. ARMY FIELD RATIONS

Replace worn-out sash with PC Glass Blocks



CORN PRODUCTS REFINING COMPANY, like many other food plants, has solved the problem of sash replacement by installing glass blocks. When six large windows needed great repair or replacement, window openings were filled with PC Glass Blocks. Intermediate piers were left in. No critical materials were required.

No critical materials required!

WHEN poor condition of window sash makes replacement necessary, why not end sash troubles once and for all by doing the job with materials that will neither rot nor corrode? Notice how this was accomplished with PC Glass Blocks in the plant of the Corn Products Refining Company, illustrated above.

PC Glass Blocks have proved popular with many food plants. They stay weather-tight under the most severe conditions. They are not harmed by highly acid and humid atmospheres so common to food plants. As a result, maintenance costs are reduced to a minimum.

Increased operating efficiencies. PC Glass Block panels flood interiors with softly diffused daylight. Dirt infiltration is eliminated. Temperature and humidity control is made easier, more exact. Cleaning is simplified — and the whole panel presents a clean, attractive appearance.

No need to wait. PC Glass Blocks can be installed without the use of critical materials. They conserve metal. We can supply PC Glass Blocks promptly. Get the facts about them now. Send for our free book that shows how plants in many branches of industry have used PC Glass Blocks successfully. If you wish, our representative will help you plan construction to avoid the use of hard-to-get materials—with no obligation or cost involved.

"PITTSBURGH" stands for Quality Glass

PITTSBURGH PC CORNING

GLASS BLOCKS

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PITTSBURGH PLATE GLASS COMPANY

and by W. P. Fuller & Co. on the Pacific Coast

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Please send me your free, illustrated book that tells how PC Glass Blocks have been used successfully in many industrial plants.

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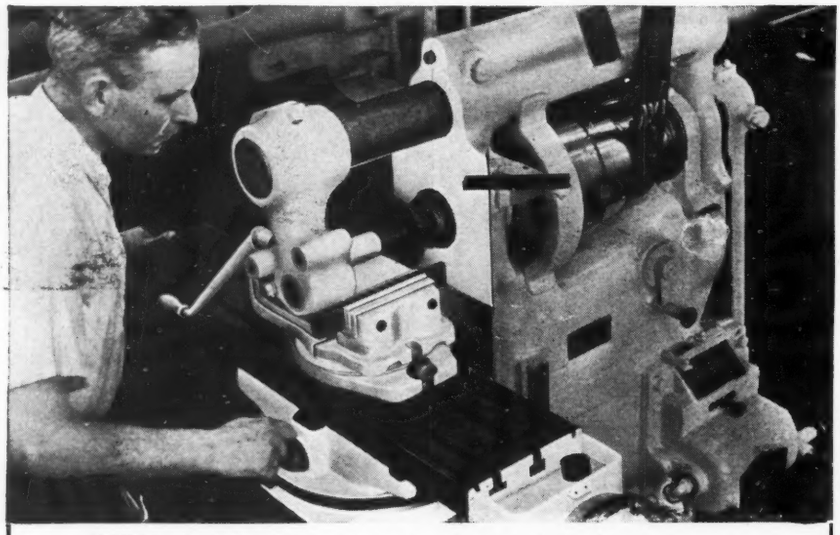
INSIDE NEWS

DECEMBER PREPARED BY NATIONAL CAN CORPORATION, NEW YORK, N. Y. 1942

"Three-Dimensional-Seeing" Technique Developed by Du Pont

Light-Colored Machinery and Plant Interiors Cut Industrial Accident Rate



AFTER the body of the machine is painted with Horizon Gray and the working surfaces with a contrasting hue, such as Spotlight Buff, the "camouflage" is removed and the material being worked stands out in sharp contrast.

"Three-Dimensional Seeing," a technique of using color and light to improve vision of machine tool operations, was introduced a year ago. So rapidly did industry adopt the idea that a three-year research program conducted by the Philadelphia Electric and Du Pont Companies was continued indefinitely. Last month before the Illuminating Engineering Society latest research results were announced.

Since the new findings are an extension of the original "Three-Dimensional Seeing" idea, it is advisable first to describe briefly what the 1941 concept was and what it aimed to accomplish.

Du Pont and Philadelphia Electric found from controlled tests under shop conditions that conventionally painted machinery provided a dangerous degree of camouflage. Dark finish coats absorb illumination instead of reflecting it. Material under fabrication blends into the dark mass of machinery, placing a heavy strain on workers' eyesight. The percentage of rejects was needlessly high. Danger points were all too inconspicuous.

Operator time-study and psychology test data were correlated with photometric readings of light reflected from machines painted in many combinations of bright, contrasting paint colors. It was recommended, as a result, that machines should be finished in light gray with working areas spotlighted with light buff.

Subsequent trial by industry bore out claims that this paint system reduced personal injuries, increased production, created more comfortable working conditions and improved morale.

The new phase of the better vision program through scientific use of light and paint colors is based on the fact that many well designed plant lighting systems are robbed of efficiency by dull walls, ceilings and floors.

Research revealed that these surfaces could be finished with paints having much higher reflection qualities than previously was thought practical. In this way, illumination may often be doubled without altering existing facilities or increasing electric consumption. The entire interior becomes a giant reflector, and light rays instead of turning up their toes and dying on dark surfaces will bounce back and forth, doing their job over and over again.

For example, a white ceiling (reflection factor 90 per cent), ivory walls (75 per cent), a dado of green enamel (68 per cent), and a white floor stippled with brown (70 per cent) provide seeing conditions greatly over the average. Injuries decline, production improves and operators appreciate their cheerful surroundings. (235)

From Melon Patch to Ice Cream Freezer

Zucca melons provide the basis for a unique British Columbia food industry. The melons are peeled and cut up into small pieces, which are packed into barrels. Sulphurous acid is poured into the barrels through the bungholes and the barrels are stored outside for a period of about ten days. They are then brought into the processing plant and stored for shipment.

The processed melons are sold to manufacturers and ultimately make their appearance in various colors and forms in tutti-frutti ice cream, in cake mixes, and in fruit cake sold by bakers.

The melons are grown in the boundary country around Osoyoos at the southern end of the Okanagan valley. The average weight of the melons is 40 to 50 pounds. (236)

Tests Oil From Po-Yok Trees

Further research into the properties of oil from the kernels of the po-yok tree has been made by the Imperial Institute with the assistance of research workers representing British paint and varnish manufacturers, reports the British trade press. Oil from the po-yok tree, which is native to tropical West Africa, is very closely related to citicica—so far the most successful commercial substitute for tung.

Tests indicate that po-yok oil has valuable properties for making paints and varnishes. The products are not equal to those made from tung, but generally are superior to those made from linseed oil, it is stated.

It is thought that Sierra Leone could ship 100 tons of po-yok kernels annually. While ordinarily this quantity would be of little commercial interest, under war conditions it merits consideration. (237)

Argentina Forms Edible Oil Industry

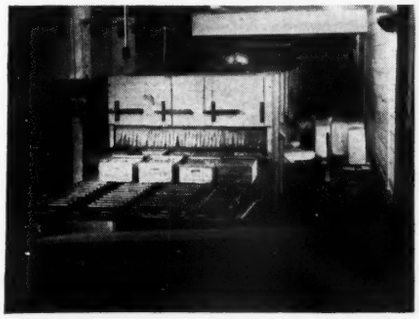
Cut off from her sources of olive oil by the war, Argentina has formed its own edible oil industry. Olive oil formerly was imported from Spain and Italy, but oil from sunflower seeds, peanuts and cottonseed is being used as a substitute. The number of workers now engaged in the Argentina edible oil industry is 123 percent higher than in 1937 and wages are 165 percent higher. (238)

* * * * *

Camphor trees, a Korean-Japanese monopoly, are being planted in California to supplement production here of synthetic camphor.

BY NATIONAL CAN

DECEMBER PREPARED BY NATIONAL CAN CORPORATION, NEW YORK, N. Y. 1942



Hydro-Cooler in Action

Hydro-Cooler Increases Shipping Range of Farm Produce

Top quality fruits and vegetables aren't top grade when the consumer opens the can in her kitchen unless the canner has been able to hold the time between harvesting and processing to a few short hours. The shorter the time, the higher the quality of the canned product. Ordinarily that means that canning plants must not be more than a maximum of 25 or 30 miles away from the fields or orchards.

Science is changing that. In the Pacific Northwest progressive growers have found out how they can ship some canning fruits and vegetables as far away as 250 miles with the assurance that they will reach the canner in A-1 condition. This is accomplished by hydro-cooling equipment which chills the produce to a point where it will not deteriorate in transit. A box-like device about 20 feet long, through which a conveyor moves, the Hydro-Cooler can chill asparagus with a field temperature of from 65° to 70° to 34° in 12 minutes. Ice is placed in the bottom of the cooler. As the produce moves slowly through it, a pump sends water over perforated baffles to spray the fruit or vegetable being cooled. The water is then returned to the bottom of the cooler for re-use. Pump capacity is 3,000 gallons per minute.

Hydro-cooled and properly shipped, produce reaches the distant processing plant in prime condition for canning. The advantage of being able to extend the radius of the source-of-supply area in wartimes, when growers of canning crops are handicapped by labor shortages, is one that few canners will fail to appraise properly. (239)

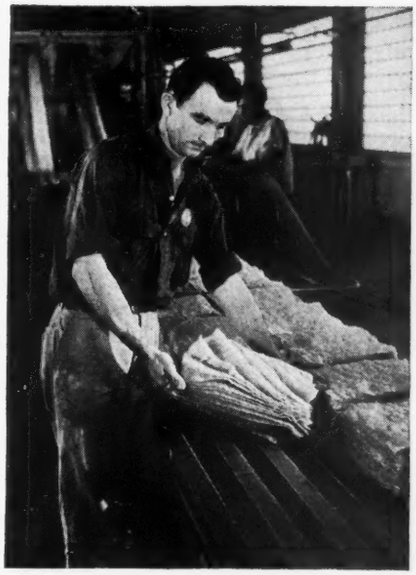
* * * * *

Men in the armed forces of the United States like their food well seasoned, judging from the vast quantities of salt and condiments purchased by the Quartermaster Corps. In recent purchases, the Jersey City Quartermaster Depot acquired 30,000,000 lb. of table salt; 1,800,000 lb. of black pepper; 3,600,000 lb. of prepared mustard, English type; and large quantities of dry mustard, the latter in 4-oz. cans for overseas shipment.

New Safety Solvent Cleans Army Rifles

A new hand-wiping safety solvent which is to be marketed as a safety replacement for naphtha, gasoline and kerosene in removing cosmoline out of rifles issued to troops, has recently been developed. The new solvent is also applicable for wide industrial use as a naphtha substitute for grease cleaning and hand-wiping operations in ordnance factories or shell plants.

The new solvent is described as a unique safety solvent because in spite of its high solvency against mineral oil or dirt, it does not de-oil the skin, has no toxic vapors, no flash or fire point, and leaves no invisible rust-preventative film so thin it cannot be detected. It is said to quickly lubricate and preserve wet metal surfaces from rust. (240)



Here It Is! This is synthetic rubber being taken off a moving belt and piled ready for shipment at one of the rubber plants of the Standard Oil Company. Less than twenty-four hours before this picture was made this same rubber for the most part was just so much petroleum refinery gas. Thanks, however, to some twelve years of pioneer experimental work and constant research, Standard's petroleum technologists learned how to convert these products into a synthetic rubber which will do its part to supply a nation whose natural rubber supplies have been cut off by Japanese conquests. (241)

* * * * *

There are 1,800 fats and oils, not counting petroleum and perfume essential oils. Of these, 30 are essential in war and industry.

Technical Topics

FERRIC SULPHATE is now used to restore the shine to brass. (242)

SULFA DRUGS, nemesis of so many bacterial diseases of men, didn't bother insects in recent tests to find its value as an insecticide. (243)

METHYL CELLULOSE is finding use in cosmetic products such as tooth paste, shaving cream, hand lotions and waving fluids (244)

GLUE volume may be increased through the addition of twenty-five percent of a new pulverized material. Glues containing the extender are also stated to flow freely. (245)

SOYBEAN and other semi-drying oils may be heated with a polyhydric alcohol and a polycarboxylic acid for the preparation of oxidizing alkyd resins by a method described in a recent United States patent. An acidic natural resin and fatty acids are employed to facilitate the combination of the oil and the resin molecules upon their formation. Solutions of the resins and a drier in mineral spirits produce films which dry hard and tough overnight. (246)

BLUE PHTHALOCYANINE is declared to be converted to a green or even yellowish-green pigment by the addition of oxazol, thiazol, or imidazol groups to the benzene nuclei of the original compound, according to a recent United States patent. The green shades are clear and fast, it is added, and were found to be suitable for use as printing pigments. (247)

BITUMEN DISPERSIONS may be economically coated on the inside surfaces of pipes to provide interior anti-corrosive coatings by an electrolytic method described in a recent British patent. Basis of the coating method was discovered when it was found that an electric current passing between two metal electrodes dipped into an aqueous bitumen dispersion caused the negatively-charged bitumen micelles to migrate to the anode and accumulate thereon as a gelatinous paste. (248)

LINSEED OIL—A new drying oil produced from linseed oil and intended as a replacement product for chinawood oil has been developed recently. In varnish cooking it is said to polymerize practically as fast as chinawood oil, and to dry hard and glass-like overnight when combined in protective coatings. (249)

Every effort will be made to furnish additional information on these articles. Where such information is not obtainable, we will refer inquirers to the original source of the article. Write to National Can Corp., 110 E. 42nd Street, New York City. Please mention the number at end of article—also name of the magazine you saw it in.

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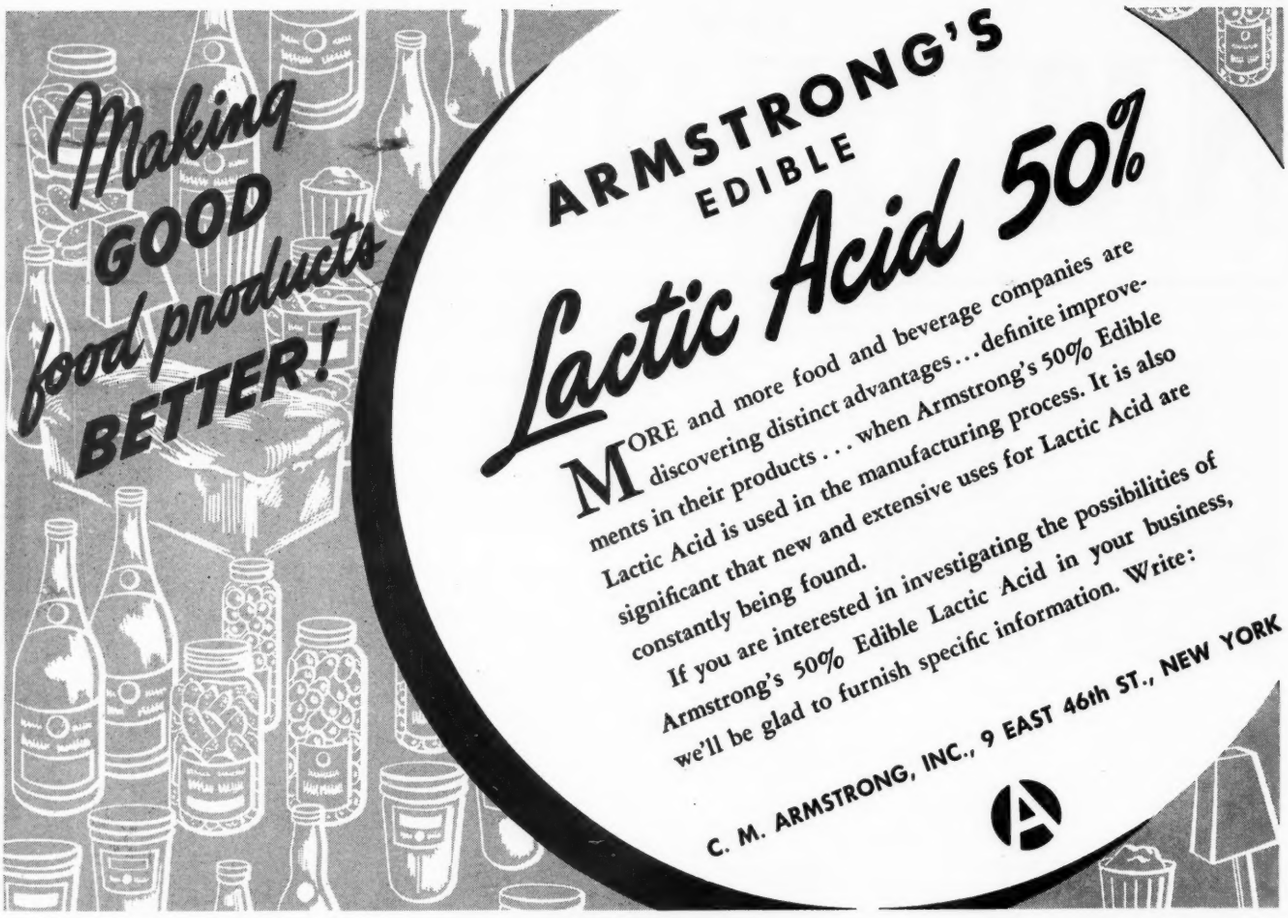

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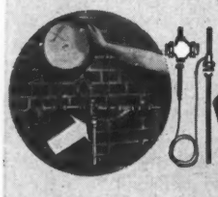
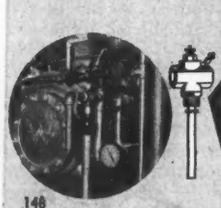
Temperature Controls for Industry

At the cost of a good steam trap, the Sarco No. 87 Thermotan takes care of condensation removal and at the same time provides approximate temperature control of steam heated tanks, kettles or other small equipment. Catalog No. 550.



Sarco type TR-21 self-operated temperature regulators are standard equipment on water and oil heaters, for all types of process work. Valves are packless — no stuffing boxes to leak or stick. Catalog No. 600.



If you are interested in saving up to 50% of the cooling water used on air compressors, condensers, stills, internal combustion engines, or degreasers, investigate Sarco type TR-40 cooling control. A low cost, rigid stem type. Catalog No. 700.

148

SARCO SAVES STEAM

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Frozen Foods Directory

This Directory is the most comprehensive "quick" picture of activities in the Frozen Foods Industry yet published. In addition to listing the names of the companies, the following data is given for the majority of them:—

1. ***WHERE*** **the freezing is being done!**
2. ***HOW*** **it is being done—what system is used!**
3. ***WHAT*** **products are being frozen!**
4. ***BRAND NAMES*** **of frozen foods!**
5. ***THE TYPE*** **and size of containers and packaging materials being used!**
6. ***The QUANTITIES*** **frozen in the past!**
7. ***THE SCHEDULED PRODUCTION*** **for the future!**

If you want to know what's going on in the Frozen Foods Industry—see this "Frozen Foods Directory." Now available at 35¢ per copy.

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CARPENTER WELDED STAINLESS TUBING

• is 100% hydrostatically tested • resists corrosion, heat and wear • is furnished in various types to meet specific processing conditions.

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Kenilworth, N. J.

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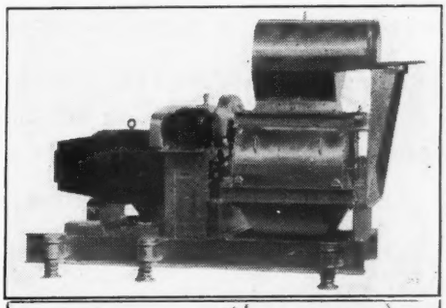
Grate—Shred—Cut and Blend Food Products with these . .

DAMROW Mills!

Built in varying capacities and according to specified requirements, the Damrow Mills do an outstanding production job. Now widely used by the Cheese and Casein industries, they are readily adaptable to use by many other food products manufacturers.



100 H. P. Mill — Cuts and Blends Cheese. Control of product provided by size of screen.

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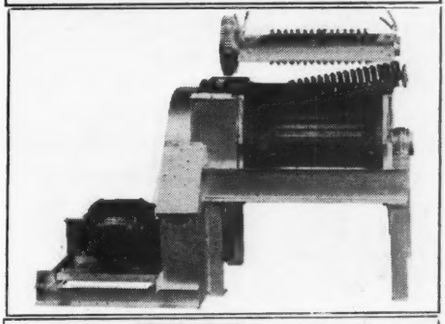
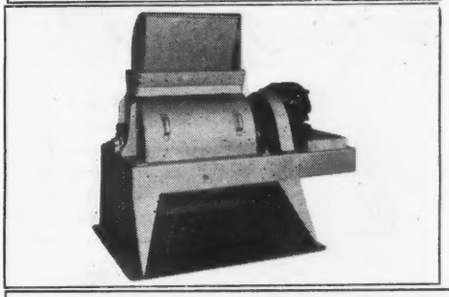
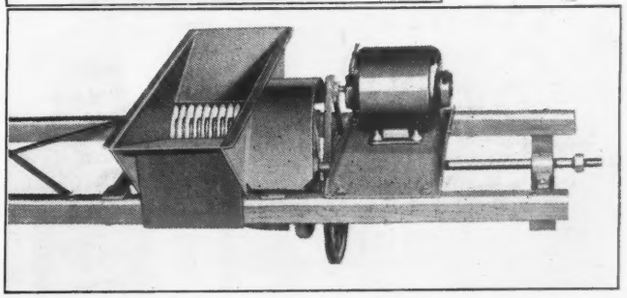


Interior view of smaller mill showing knives, drum inside beater. Note the fine construction. No breakdown here.

•



Junior Mill — Does not have shredders, so product fed to it must be cut smaller than for larger mill.



Cutting Mill—Portable. Cuts fine, medium and coarse. Does not crush product.

★ *For more detailed information regarding these mills or for engineering assistance in the use of them, write for bulletins.*

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(*U.S. Pat.)

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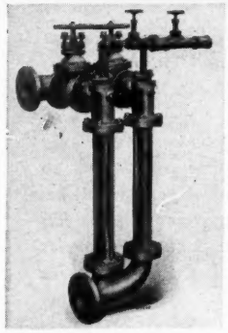
STEAM JET EJECTORS



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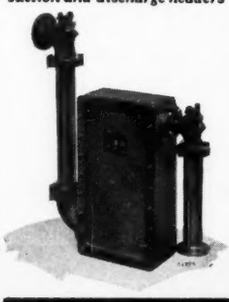

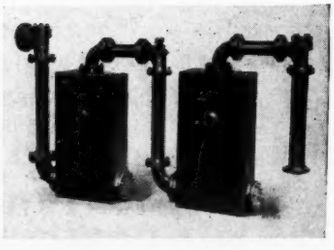

(Above) *3-stage ejector with barometric intercondensers*

(Left) *2-stage ejector mounted on a barometric intercondenser*

Ingersoll-Rand
4-167 11 Broadway, New York, N. Y.

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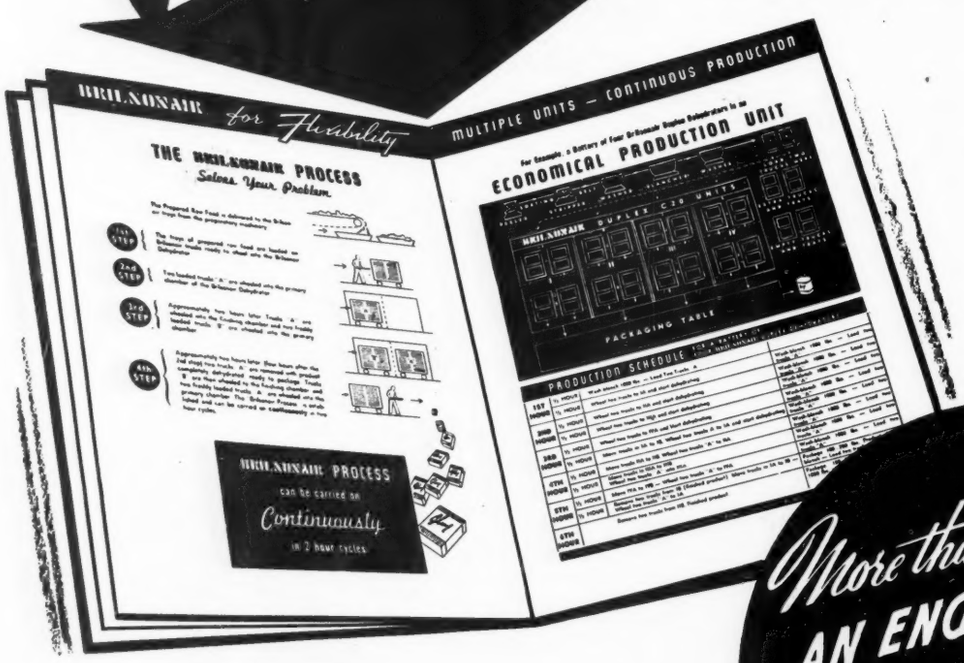
"More than a machine — an Engineering Process" is sound logic . . . the Brilsonair is a scientific contribution to the modern advanced tempo of food dehydration. We promise you that your reading of this catalog will greatly reward you for the small effort of writing for it.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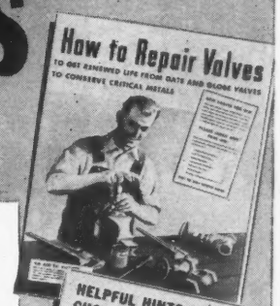
IT'S EASIER WITH "PIPING POINTERS"



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Rush me .... set(s) of "Piping Pointers" Bulletins.
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Get the facts first!

PRE-PRODUCTION TEST DRYING REVEALS CORRECT METHODS

Despatch Laboratory Oven Gives Needed Time-Temp. Data

It's easy to obtain practical data on correct dehydration procedure *before* you start production—if you use a Despatch laboratory oven.

This is because a Despatch oven accurately produces on a small scale the heat and air-flow conditions desirable in full-scale dehydration production. Even humidity control is available if desired.

RUN THIS EASY TEST

1. LOAD prepared samples on convenient mesh shelves of the Despatch laboratory oven.
2. PROCESS samples at any desired temperature (±1° C. control accuracy). You may follow a straight-line program or increase or decrease heat; there will be immediate response to any new setting. Oven will speedily recuperate following insertion of new samples.
3. TEST finished product for moisture-content, appearance, color, refreshing ability, etc.
4. APPLY data to your regular production.

GET INTO PRODUCTION FASTER

The control information you obtain as a result of this preliminary testing can immediately be applied to production. Having learned the effect of certain time-and-temperature combinations on representative samples, you have data to suggest the heat, air and humidity conditions necessary in your main dehydrating equipment.

FACTS ABOUT DESPATCH OVENS

Despatch laboratory ovens are rugged and compact, designed for widest utility in the food laboratory. **ACCURATE** throughout their range (to 500°F.), these ovens maintain **UNIFORM** heat regardless of load. Control equipment accurate within ±1° C.

Handles many samples at same time with easy-loading mesh shelves. **SPEEDY** heat transfer and effective recirculation assure controlled processing; fast recuperation after loading.

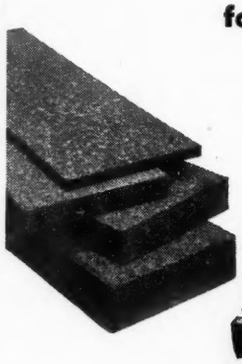
SIZES are from 13" x 13" x 13" to 37" x 25" x 37". Electric or gas-fired systems.

WRITE FOR BULLETIN 105-P. Complete details as to sizes, construction and pe formance. Be sure to specify optional humidity equipment if this is desired.

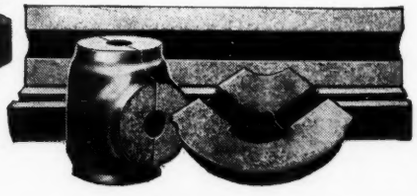
DESPATCH OVEN COMPANY
MINNEAPOLIS MINNESOTA

IS CORK AVAILABLE FOR YOUR INSULATION NEEDS?

The answer is *YES* on most low-temperature construction in the perishable food field.



Prompt delivery of NOVOID CORKBOARD and NOVOID CORK COVERING on A-10 priority or better.



WHAT do you want in an insulating material? You want efficiency, of course . . . efficiency that lasts for a long, long time. You want insulation that keeps your refrigeration *costs down* and keeps stored foods *safe*.

Novoid Cork Insulation gives you this complete protection. It offers unusually low thermal conductivity, high moisture-resistance, durability, light weight, structural strength, rigidity, and fire-resistance. In fact, no other material can equal CORK in all these essential qualities.

If you're planning insulated construction for storing perishables, especially where extreme low temperatures must be closely controlled, chances are you can get Novoid Cork Insulation now. Write us today for complete information.

Non-Priority Insulation Also Available

NOVOID MINERAL WOOL BOARD

Here is a new yet thoroughly dependable insulation that has already proved itself in hundreds of low-temperature applications. It is readily available for both priority and non-priority work. This new board is basically mineral wool with a waterproof binder. Its thermal coefficient is lower than 0.33 Btu at 75°F., and in all respects it equals or exceeds Federal Specification HH-M-371 for board or block form insulation. Novoid Mineral Wool Board offers structural strength, moisture-resistance, freedom from objectionable odor, or from any liability to rot, mold or harbor vermin. Convenient size and thicknesses for quick erection. Let us give you all the facts on the complete Novoid Line. Write to Cork Import Corporation, 330 West 42nd Street, New York City.

NOVOID INSULATION

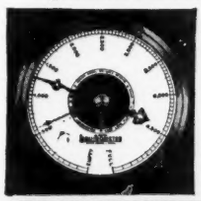
CORKBOARD • CORK COVERING • MINERAL WOOL BOARD

We Don't Grope Blindly When Measuring Valuable Stored Liquids... We Check With

LIQUIDOMETER *Tank Gauges*

"THEY'RE ALWAYS DEPENDABLE"

Now, more than ever, industrialists realize the importance of having accurate measurements of their stored liquids available at all times. LIQUIDOMETER Tank Gauges insure true, convenient, hazard-free, 100% automatic readings. No pumps, valves, or auxiliary units required to read them. Models are available so that readings can be taken remotely from or directly at the tank. Remote reading types utilize balanced hydraulic transmission system which completely compensates for temperature variations on communicating tubing. Accuracy unaffected by specific gravity of tank liquid.



Approved for gauging hazardous liquids by Underwriters' Laboratories and similar groups.

Models available to automatically control pumps, motors, signals or other devices for maintaining minimum or maximum liquid levels.

Write for complete details

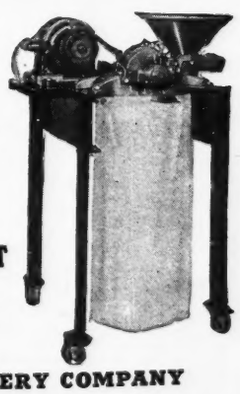
THE LIQUIDOMETER CORP.

38-14 SKILLMAN AVE., LONG ISLAND CITY, N.Y.

We're at WAR!

PUT *Your* PULVERIZING ON AN *All Out* BASIS

In wartime, dust is an insidious and deadly foe. Defend your precious production from fire and explosive hazards caused by dust. Improve working conditions at a time when workers' health and morale are weapons for victory. Use an absolutely dustless Mikro-Pulverizer. No fans, separating devices, cyclones or large air pipes.

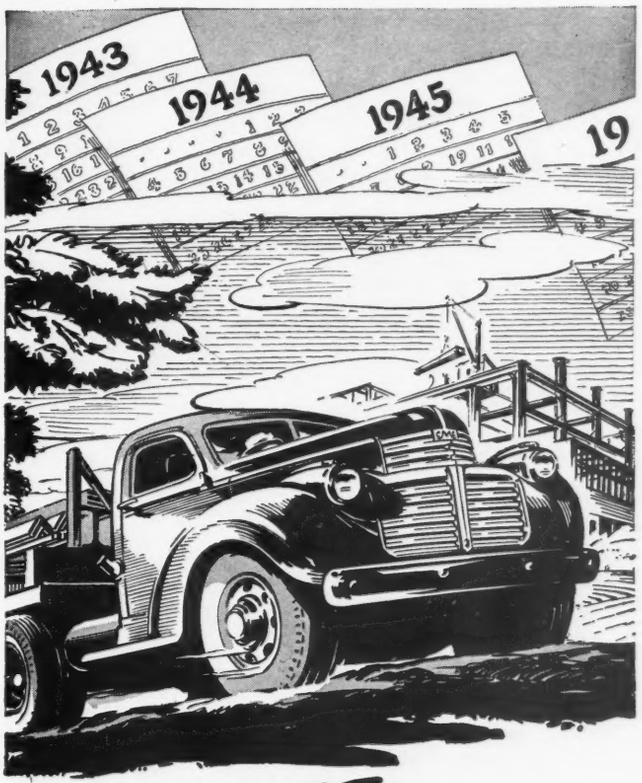


FREE CATALOG • FREE GRIND TEST

A 32-page catalogue sent on request. And to back up the proof of the catalogue we'll make a sample grind of your materials—free.

PULVERIZING MACHINERY COMPANY

97 Chatham Road • Summit, N. J.



LET GMC SERVICE KEEP YOUR TRUCK *IN SERVICE* FOR THE DURATION

No one can predict exactly how long the war will last. One thing about it, though, is certain, the longer it does last, the longer America's trucks must stay in operation. One of the country's large motor transport systems, using Preventive Maintenance, operates its vehicles on the average of 150,000 miles without a single road delay, including tires. Other truck and coach operators have had similar results using service methods patterned after GMC's proved P.M. procedure. You, too, will want to give your equipment the *best service* so that it will *stay in service* for the duration. Get the details from your GMC dealer or branch today!

Special "Service Payment Plan" available through our own YMAC

THE TRUCK OF VALUE

GMC TRUCKS

GASOLINE-DIESEL

PFAUDLER'S FLASHES

Published by THE PFAU

NOVEMBER, 1942 Vol. 4, No. 1

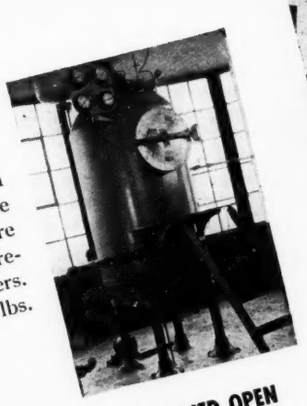
WHAT'S YOUR FOOD CONCENTRATION PROBLEM?

PFAUDLER COOKING KETTLES AND VACUUM EVAPORATORS ARE STEPPING UP PRODUCTION

Pfaudler Food Engineers are at your service in helping you solve today's concentrating and dehydrating problems. If you will tell us your problem, we will help you with it to the best of our resources. Following are some standard types of cooking and concentrating equipment designed for this work. We also custom build to your exact needs.

COIL EVAPORATION

Maintaining the proper percentage of total solids is easily accomplished in this unit. May also be used as finisher where products are first preheated in open cookers. Capacities from 50 lbs. per hour and up.



TUBULAR DESIGN FOR CALANDRIA TYPE WORK

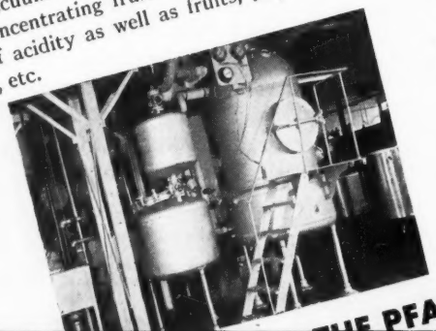
This vacuum unit assures you fast evaporation on a continuous basis in capacities from 4,000 lbs. per hour and up. Good natural circulation of product over vertical type tubular heating element designed for volume reduction of tomato juice and other liquids, effects maximum speed and economy.

GLASS-LINED OPEN REDUCING KETTLES

These glass-lined units with coil-type heater are especially efficient in reducing tomato production, apple and other fruit butters, etc. Such units have cut processing time as much as 50%, making it possible to double output in a given time. Easy to clean.

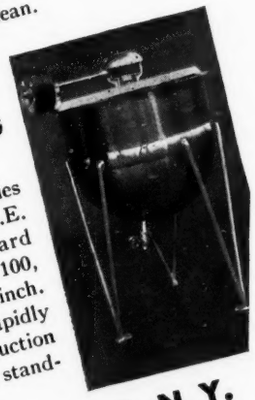
JACKETED EVAPORATORS

Especially adapted for standardizing work, these glass-lined vacuum evaporators are also especially useful for concentrating fruit and vegetable juices regardless of acidity as well as fruits, jellies, jam, fruit pastes, etc.



STAINLESS STEEL COOKING KETTLES

These hemispherical kettles are fabricated to A.S.M.E. regulations for standard jacket pressure of 60, 100, or 125 lbs. per square inch. These kettles heat rapidly giving increased production per unit. Made in all standard sizes.



PFAUDLER GETS IN THE SCRAP

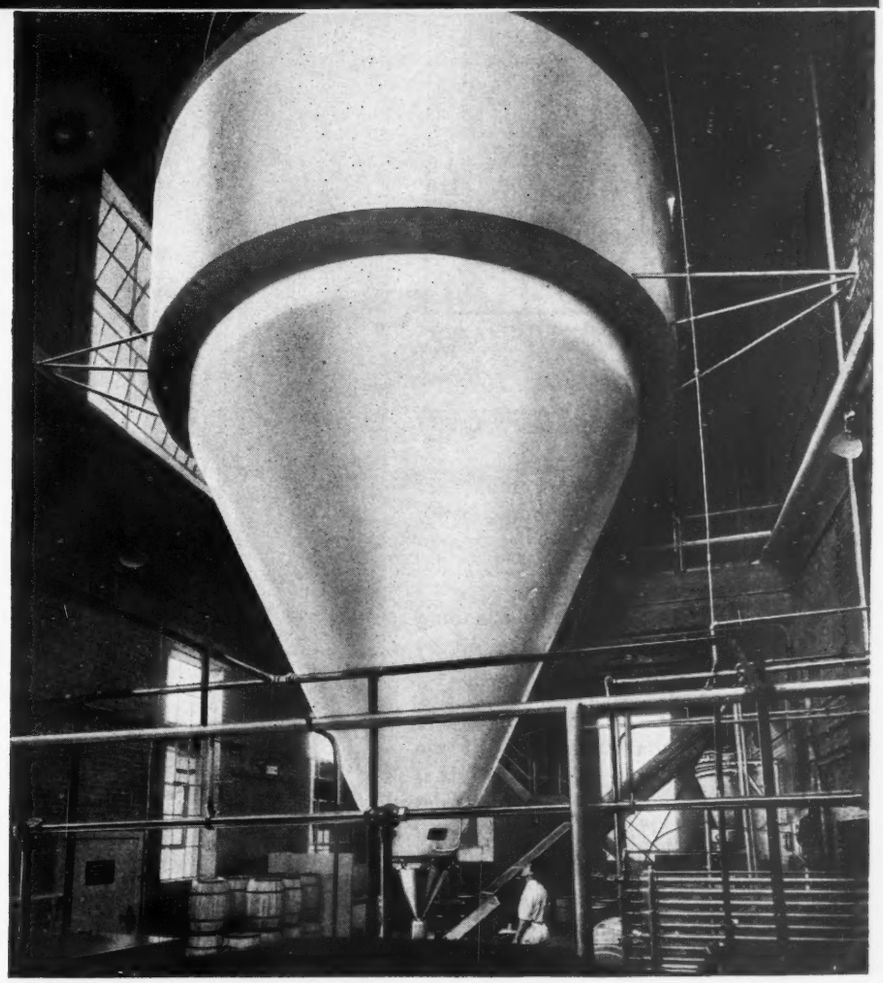
Since Pearl Harbor, Pfaudler has sent back more than 1,000,000 lbs. of scrap to the mills. Are you doing your share?

THE PFAUDLER CO., ROCHESTER, N. Y.

FOOD PROCESSING ENGINEERS AT YOUR SERVICE — PFAUDLER — GLASS-LINED & STAINLESS STEEL PROCESSING EQUIPMENT

Douthitt Designed Equipment
For Flexible and Exacting Food Dehydration

The
GRAY-JENSEN SPRAY PROCESS DRYING PLANT

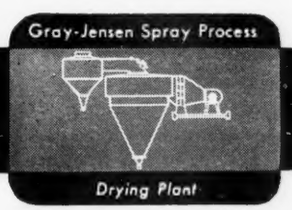


Designed for the spray drying of dairy foods, infants, foods, soup mixtures and all other food products and chemicals that can be reduced to liquid form and handled with pumps, the Gray-Jensen Spray Process Drying Plant continues to be the acknowledged leader in the field. The flexibility of this Douthitt designed unit allows for the successful and economical processing and at a lower manufacturing cost per pound of powder.

OVER 175 WORLD WIDE INSTALLATIONS OF DOUTHITT DESIGNED DEHYDRATING PLANTS

Behind every Gray-Jenson unit and Douthitt Designed fruit and vegetable dehydration unit stands a staff of research scientists, dehydration specialists, skilled construction engineers and operating craftsmen which guarantees satisfactory performance.

*Solubility * Full Recovery of Solids * Flavor Goodness * Keeping Quality * Economical Operation*



The **DOUTHITT CORPORATION**
CHICAGO, ILLINOIS

A COMPETITIVE MARKET DEMANDS ECONOMIZED PRODUCTION—INDIVIDUALIZED EQUIPMENT

The test of successful sales competition lies in the quality of the product, in the economy and efficiency of its manufacture.

Proof that the Food Industry has long recognized this fact is demonstrated by the demand for individualized equipment —KOVEN equipment.

Through the combined facilities of the Jersey City and Dover Plants, KOVEN is expertly qualified to design and construct the most exacting, specialized type of equipment.

Call us today for the answer to *your* equipment problem.

Among the many KOVEN products:

Stainless Steel	Monel Metal Fabricator
Aluminum Sheet Fabrication	Pails, Special Heavy
Boxes, Tote, Waste Cans	Pans, All Types, All Metals
Chemical Apparatus	Sinks, Scullery and Factory
Coils and Pipe Bands	Tables, Galvanized or Monel
Copper Sheet Fabrication	Tanks, All Types, All Metals
Galvanizing Work	Kettles, All Types, All Metals
Mixers, All Kinds	

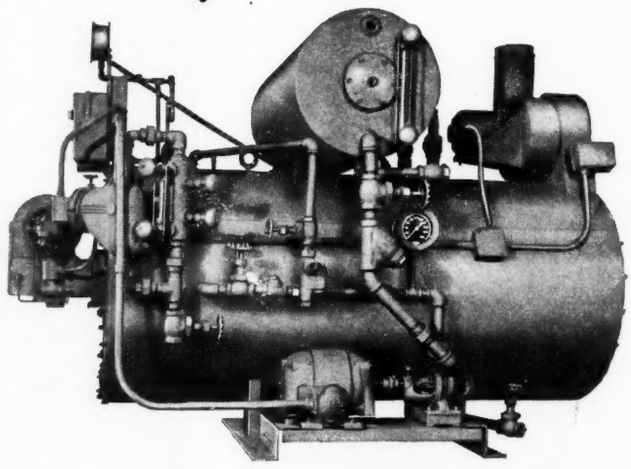
WATERFILM Industrial Heating Boilers

PLANTS
Jersey City, N. J. Dover, N. J.

L. O. KOVEN & BRO. INC.

154 Ogden Avenue
JERSEY CITY, N. J.

from the Drafting Boards of O & S . . .



came this revolutionary

O & S BOILER

now used by the U. S. Army

• ORR & SEMBOWER'S engineers—responding to Uncle Sam's call—designed this compact 15-h.p. boiler with *built-in condensate return system* and *induced draft* for use in mobile laundry units. It offers several other outstanding features, too . . .

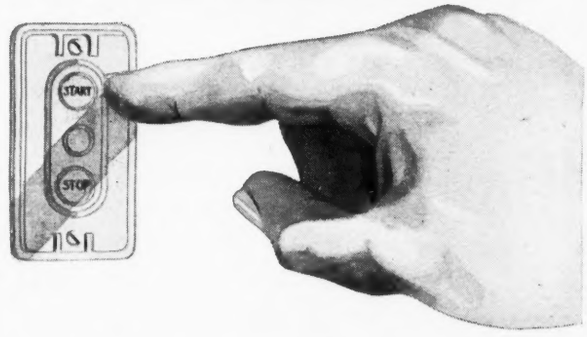
★ **100 lbs. pressure from 60° water in 20 minutes!**
★ **Fully-automatic control!**
★ **Weight complete - 2100 lbs.!**

Although developed expressly for mobile use in the Army's laundry units, this unique O & S boiler promises wide application in your industry when Victory makes O & S boilers again available for all purposes.

O&S **ORR & SEMBOWER**
INCORPORATED
Builders of Better Boilers Since 1885

READING • PENNSYLVANIA

Just Press a Button..



LINCOLN CENTRO-MATIC LUBRICATING SYSTEM

makes it possible to lubricate every bearing on your food machines without having to handle a grease gun

Fullfilling the food requirements of a nation at war is a tremendous job—food in unparalleled volume—acute shortage of men and machines. These problems are being performed capably by food industries. To keep machines and equipment going at top speed, positive and speedy lubrication of bearings becomes a factor of vital importance. Now *all* bearings on a machine can be properly lubricated instantly and automatically.

The installation of a Lincoln Centro-Matic System does away with the need of having a man contact each bearing to be lubricated. This modern method of centralized lubrication assures greater safety and economy, and permits machines to run continuously without "time out" for lubrication. Great savings are affected in man-hours and in machine-hours.

A Centro-Matic System consists of a number of Centro-Matic Injectors—one for each bearing—and a hand-operated or a power-operated Centro-Matic Lubricant Pump. A power operated system can be semi-automatic (just press a button), or it can be full automatic. The injectors can be grouped in manifold or located separately at each bearing. In either arrangement only a single lubricant supply line is required.

Easily installed on new or old machines, or on a series of machines. Please write for Bulletin 888-F, and send us blueprints of the machines you plan to lubricate. Our engineers will gladly make recommendations.

ARMY-NAVY PRODUCTION AWARD for high achievement in the production of war equipment has been conferred upon the Lincoln Engineering Company. It serves as inspiration toward greater and greater accomplishment until the time of final and complete Victory. 142-34

LINCOLN ENGINEERING COMPANY
PIONEER BUILDERS OF LUBRICATING EQUIPMENT
ST. LOUIS, MO.

THE Simplest ROTOR IN THE WORLD

The Premier Colloid Mill is a gravity flow vertical colloid mill. Pressure feed can be applied when desired. It has only one moving member—the rotor. This rotor consists of a smooth face upon a frustrum of a cone. *The rotor has no teeth and no complicating mechanisms.*

It has no sharp edges which may wear in use. Because of the simplicity of mechanical operation, Premier Mills require a minimum of maintenance and attention. The rotor—the simplest in the world—assures purchasers of Premier Colloid Mills longer service without costly interruptions caused by breakdowns.

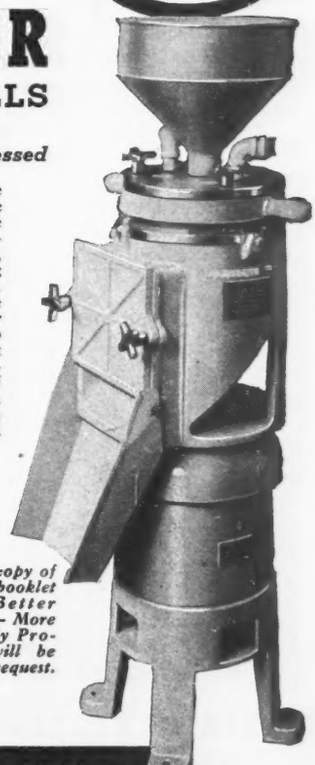
A STATOR THAT'S *Instantly and Accurately* ADJUSTABLE

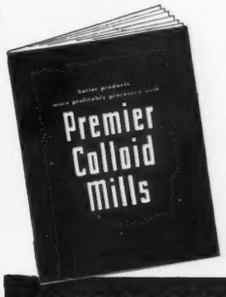
The Premier Colloid Mill can be instantly adjusted to any degree of clearance between the opposing faces of the rotor and stator. The micrometer adjusting ring makes possible adjustments from .001" to .125" or more.

PREMIER COLLOID MILLS

For Better Products More Economically Processed

Premier Colloid Mills have won recognition from a wide range of industries as the most efficient types of machines for disintegrating, dispersing and emulsifying solids, liquids and pastes. Premier Colloid Mills are built with the *simplest rotor and stator in the world.* No matter what your product is, if uniform and even mixing of products is part of your processing problems, a Premier Colloid Mill can serve you efficiently and profitably.





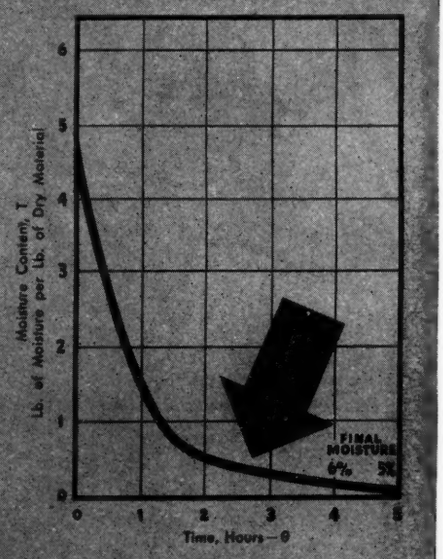
FREE. A copy of our new booklet C-10 "Better Products — More Profitably Processed" will be sent upon request.

PREMIER MILL CORPORATION
218 GENESSEE STREET GENEVA, NEW YORK
New York Sales Office: 110 E. 42 Street, New York, N. Y.

PREMIER

SUPPLEMENTAL DRYING for Vegetable Dehydration

...speeds production, protects quality



Experimental drying curve. Note rapid fall in moisture at the beginning of the run and very slow final approach to dryness.

STUDY of the chart shown on this page will reveal a fact already known to most food dehydrators: While a large percentage of the moisture content in vegetables can be removed during the early stages of the drying cycle when using a conventional tunnel or batch type dryer, TIME becomes an increasingly serious problem as the drying progresses.

W. B. Van Arsdel, Chief, Engineering and Development Division, Western Regional Research Laboratory, U. S. Department of Agriculture, Albany, California, in the summary of an article appearing in the November issue of FOOD INDUSTRIES, has this to say on this point:

★

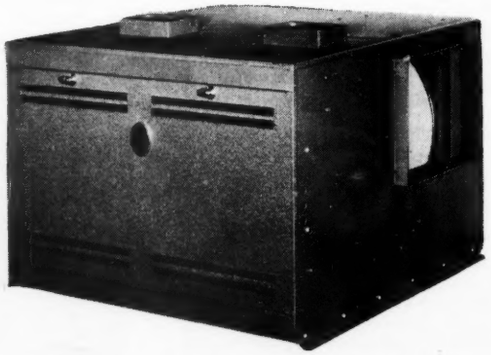
"Total drying time increases very rapidly as the final moisture content is pushed close to its equilibrium value. This factor is frequently the most important one of all. Almost as much time may be consumed in reducing final moisture content from 6 percent to 5 percent or 4 percent, as in bringing it all the way down to 6 percent. (See curve) When such a condition as this is indicated, there is likely to be good justification for a special finishing dryer which will be supplied with artificially dried air."

DEHYDRATED AIR, or artificially dried air—properly applied as a supplemental or "finishing bin" operation—answers this problem. Onion flakes for instance, which have been dried to approximately 12 percent by conventional means are being subsequently dehydrated to a moisture content of 4 percent by the CARRIER DEHYDRATOR.

In this and other applications, such as preventing moisture regain in hygroscopic food products AFTER dehydration CARRIER AIR CONDITIONING plays a vital role in protecting the "end product."

Carrier

AIR CONDITIONING
REFRIGERATION
DEHYDRATION



THIS CARRIER DEHYDRATOR is used widely in industry for the direct control of the moisture content of air. Gas or steam can be used for reactivation. Operation is completely automatic.

This coveted honor, the Army-Navy "E" pennant was awarded to Carrier Corporation for excellence in war production.

Carrier Corporation, Syracuse, N. Y.
"Weather Makers to the World"
Desk L-19

Please send me further information on Supplemental Drying for Food Dehydration.

Name .....

Company .....

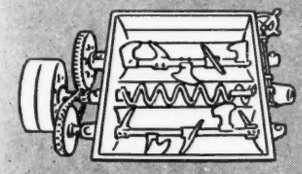
Address .....

It's A Mixed-Up WORLD!

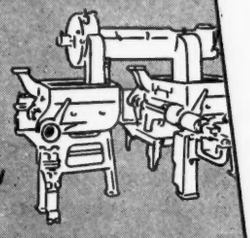
War has turned everything topsy-turvy. For instance, here we advertise HOTTMANN Mixing Machines to you and yet we can not fill your order unless it bears the approval of the War Production Board. Which means, of course, that to buy a HOTTMANN Mixing Machine today, your need must be urgent to the war effort.

However, because mixing is a vitally important process in the essential food industries, it is quite possible that *your* order for needed equipment may be approved. We suggest that you tell us your requirements and let us recommend the HOTTMANN equipment that will do your job most efficiently and economically. Take advantage of our 28 years' experience in designing and building mixers and cutters for a wide range of meat and food products, powders, colors, pharmaceuticals, dyestuffs, cosmetics and many other products.

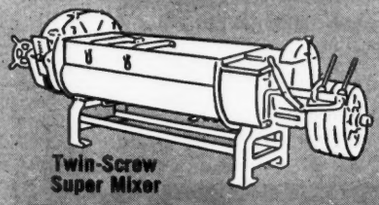
Another thing! Be sure to keep your HOTTMANN Machines in first-class working order. These are days when all production equipment must give efficient performance as long as possible. We will be glad to give you complete information on our repair and overhaul service.



Mixer, Interior View



Yeast Machinery

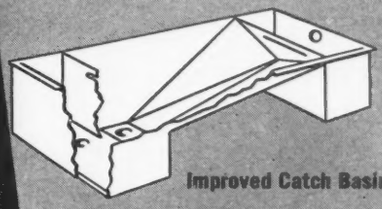


Twin-Screw Super Mixer

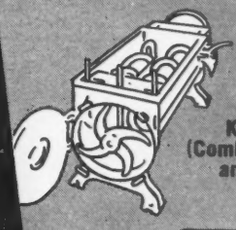
Tomorrow's Mixing Problems ... Should be Solved Today!

Every progressive manufacturer in the food and chemical process industries is planning *today* for his *future!* Under the pressure of war urgency, many new developments in products and processes are taking shape rapidly . . . developments that will completely change your post-war production methods. These foreshadow new problems in *mixing*, on which we are prepared to help you *now!*

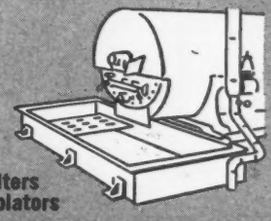
PUT YOUR MIXING PROBLEMS UP TO HOTTMANN



Improved Catch Basin



Kutmixer (Combined Cutter and Mixer)



Fat Melters and Percolators

THE HOTTMANN MACHINE COMPANY

3325-47 East Allen Street • Philadelphia, Penna.

IN SPITE OF WARTIME STANDARDIZATION, you can make your glass packages stand out from the others! Just give them the extra eye-appeal of decorated Armstrong's Metal Caps. The brilliant lithography on these closures acts as a stop-signal for shoppers, and provides extra advertising for your name or trade-mark. And even after your package is in the consumer's home, Armstrong's Metal Caps will continue to sell your name.

Properly applied, these sure-sealing closures will give your products maximum protection. They'll keep foods fresh until the day they're used.

Write us now for complete information about Armstrong's complete closure line, as well as Armstrong's wide range of glass containers for foods. And remember, Armstrong's staff of research experts is constantly working on new closure ideas, experimenting with alternate materials to meet possible future restrictions. For ideas on how to make your wartime packages stand out from the others, send your container and closure in for suggestions. There's no obligation.

Armstrong Cork Company,
Glass and Closure Division,
910 Arch St., Lancaster, Pa.

Armstrong's Closures

TURN STANDARD CONTAINERS INTO STANDOUT PACKAGES

One critical war material of which there's no shortage

AS the war goes on, it is becoming an increasingly *vital* material. Fortunately, it is also becoming a more *plentiful* material.

It is *ingenuity*. Yankee ingenuity. The kind of ingenuity that has helped American industry do the "impossible" in an impossibly short period of time.

It's the kind of ingenuity you've seen in the paperboard and carton industry. Ingenuity that has helped make it possible to ship as much food in *one* hold as formerly required *ten*—through the development of protective cartons for dehydrated foods. Ingenuity that has devised special paper boards and containers in which to send ammunition, medical supplies and ordnance parts to far-flung battle-fronts with far greater safety and convenience.

It's the kind of ingenuity, too, that is helping many a manufacturer convert from containers of critical materials, no longer available, to non-critical materials. The kind of ingenuity which has developed a new, money-saving coated board, produced in one continuous operation, at an almost unbelievable speed . . . that has brought about new accuracy and precision engineering in folding cartons to reduce spoilage and jam-ups in filling machines.

In the research laboratories of Gardner-Richardson, as well as in those throughout the industry, the skill and knowledge . . . and ingenuity . . . of carton and paperboard engineers . . . continues at work to solve today's problems. And tomorrow's.

The GARDNER-RICHARDSON Co.

MIDDLETOWN, OHIO

Manufacturers of Folding Cartons and Boxboard

Sales Representatives in Principal Cities: PHILADELPHIA • CLEVELAND • CHICAGO • ST. LOUIS • NEW YORK • BOSTON • PITTSBURGH • DETROIT

GET THESE

REPRINTS!

9 **Quality Separation by Differences of Density** — a unit operation of food engineering—by the editor of Food Industries, Dr. L. V. Burton. This is a specially bound, 15-page article of interest to all food manufacturers. Contains 16 charts, diagrams and photographs, 35 cents each.

11 **Magazine Feeds Solve Some Package Wrapping Problems**—Methods of feeding packages to the wrapping machines—type and rate of production determine what kind of feed should be used—construction and operation are explained in detail. Reprinted from Sept. 1936 issue. 10 cents each.

12 **Materials Handling** — Every branch of the food industries uses this operation to reduce manufacturing costs and coordinate processes. This article covers practically anything that cannot be handled in pumps. Reprinted from October 1936 issue. 10 cents each.

15 **Centrifugal Separation** — A unit operation that permits economy in the separation of solids or liquids from other liquids, strictly mechanically. Descriptions, types and uses in the food industries are discussed. Reprinted from April 1937 issue. 10 cents per copy.

17 **Minimum Quality Standard for Canned Tomatoes**—as issued by the U. S. Dept. of Agriculture, Food and Drug Administration—with authenic color swatch. Price 10 cents each.

18 **Tentative United States Standards for Grades of Frozen Lima Beans**—as issued by the U. S. Dept. of Agriculture, Agricultural Marketing Service—with authentic color swatch. Price 10 cents each.

19 **Tentative United States Standards for Grades of Frozen Peas**—as issued by the U. S. Dept. of Agriculture, Agricultural Marketing Service—with authentic color swatch. Price 10 cents each.

20 **Public Relations for Industry**—a presentation of the imperative need of mutual understanding in the conduct of our daily work . . . with special reference to the food industries. 10 cents each.

22 **1942 Edition Frozen Foods directory.** Lists companies engaged in packing frozen food, together with the location of their plants, brand names, products packed, containers and systems used, and output. 35 cents each.

23 **Packaging for Frozen Foods—Packaging Machinery, Containers & Supplies—Mistakes to Avoid in Packaging**—a 48-page booklet, attractively bound in 2-color paper covers, and originally published as a special supplement to the March, 1939 issue of Food Industries. Contains information of lasting value. 35 cents each.

24 **Tentative United States Standards for Grades of Canned Grapefruit Juice**—as issued by the U. S. Dept. of Agriculture, Agriculture Marketing Service—with authentic color swatches. Price 15 cents each.

25 **Tentative United States Standards for Grades of Dried Prunes** as issued by the U. S. Dept. of Agriculture, Agricultural Marketing Service—with authentic color swatches. Price 10 cents each.

32 **A symposium by some of the country's leading authorities on Consumer Research** — reprinted from the March, 1941 issue. It tells how to secure a true picture of consumer reactions to your products and how to interpret these facts in adapting your product to meet their requirements or satisfy their particular preferences. 20 cents per copy.

33 **U. S. Inspection and Grading**—Published originally in the May, 1941 issue of Food Industries, this 32-page reprint contains seven important articles profusely illustrated with photographs from the field. Article titles include: "First User of A.M.S. Tells Why"; "Manufacturers' Brands Benefit From A.M.S. Shield on Labels"; "A.M.S. Inspection Means More Sales at a Profit"; and "What's Behind U. S. Inspection and What It Involves". 20 cents per copy.

34 **How to Control Vitamin Content** —a 32-page symposium of experience with vitamins in foods on an industrial scale reprinted from June, 1941 (32 pages) and July, 1941 (12 pages). Both sections, while they last at 50 cents per set.

35 **Controlled Atmospheres** — Why "controlled atmospheres" are important to you; what they can do for you, and applications in the Food Industries. 48 pages. Reprinted from June, 1936 issue. 25 cents each.

37 **Preference Ratings Are Your Job** —Eight pages. Priorities and allocations. What to look for and how to make the most of your findings are told in this article. Reprinted from January 1942 issue. 20 cents each.

38 **Protect Your Plant from Bombs and Sabotage.** Food Processing plants must guard against air raids and sabotage because it is a war necessity to keep the production of processed foods at a high level to feed the armed forces and civilians of the United Nations. Effective plant protection, setting up lines of authority, and duties within the plant are covered in this article reprinted from February 1942 issue. . . . 4 pages. . . . Free of charge.

39 **Food Must be Packaged . . . Even In Wartime.** Restrictions on materials have made packaged difficult. The largest food production in this country must be packaged in 1942. Many things can be done and are being done to alleviate the situation. . . . 12 pages summarizing the steps being taken by manufacturers of packaging materials, packaging machinery, food packers and the government. Reprinted from April 1942 issue. . . . 12 pages. . . . 25 cents per copy.

40 **Flow Sheets of the Food Industries.** Developed by Food Industries and specifically designed for production men to give them basic information on standard processes in use throughout the food processing field. Size, 8½ x 11 inches, attractively bound in paper folder. 36 pages. . . . 50 cents per copy.

For Quick Results Mail Coupon Today

FOOD INDUSTRIES,
330 W. 42nd St.
New York, N. Y.

I have circled below the reprints I want and enclose check ( ) cash ( ) covering cost. Please mail at once.

9	11	12	15	17	18	19	20	22	23
24	25	32	33	34	35	37	38	39	40

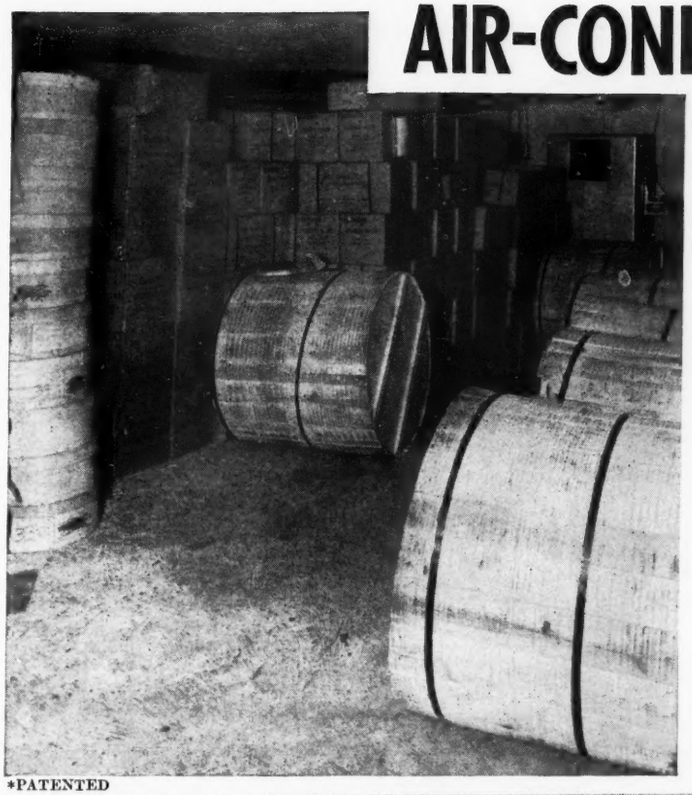
Name .....

Company .....

Street .....

City & State .....

AIR-CONDITIONED STORAGE



with the NIAGARA *No Frost* SYSTEM* maintains High Quality in Perishable Foods

By maintaining constant, full capacity, never decreased by progressive icing of refrigerant coils, the Niagara "NO-FROST" System produces at all times rapid, uniform cooling of products freshly put into storage... resulting in higher quality of eggs, butter, cheese, produce, and other foods.

Niagara equipment includes: dry coil fan coolers, disk fan coolers, spray coolers, "No-Frost" Systems, precise control air conditioning.

Write for Bulletin #83

NIAGARA BLOWER COMPANY
Dept. FI-122
6 E. 45th Street New York City
Chicago: 37 W. Van Buren St.
Seattle: Fourth & Cherry Bldg.
Buffalo: 673 Ontario Street

District Engineers in Principal Cities

*PATENTED

NIAGARA *INDUSTRIAL* COOLING • HEATING • DRYING HUMIDIFYING • AIR ENGINEERING *EQUIPMENT*

Increase Your Production, Lower Fuel Costs *with the*

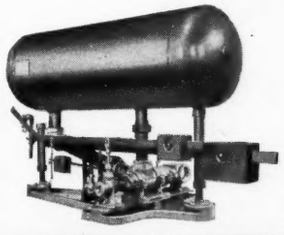
★ ACKER ★

Deaerating System of Steam Drainage and Boiler Feeding

ACKER Equipment users report results like these: "20% production increase on vacuum pans and 20% fuel savings."

Another company—"27% increase in output." "13 to 15% more production, with appreciable savings in fuel"—from another.

You can do the same. Ask us how!



Write, wire or telephone for more information.

W. M. ACKER ORGANIZATION, INC.
3169 Fulton Road Cleveland, Ohio

Did you know?—there is a single Information Center

TO HELP FIND THE RIGHT PACKAGE FOR ANY DEHYDRATED FOOD

• *Tell us* what you want to package—and we can show you the perfect package for your purpose; one to fit your packaging budget! For, ours is a complete line of packagings . . . developed after an exhaustive study of dehydrated food needs . . . offered now, only after careful comparison tests that indicate properties either equal to, or superior to the best among other representative packages! There is no obligation when you ask for our recommendations (but please write fully about your problem) and we'll work with you as closely as you may desire.

M.S.A.T. CELLOPHANE LAMINATED WITH VEGETABLE PARCHMENT—*In tests of grease-proof qualities, light transmission and moisture-vapor resistance,* far superior *to the best among other packages.*

M.S.A.T. CELLOPHANE LAMINATED TO GLASSINE — *Fully equal to any similar package tested; superior to most because of* heat sealed sides — *rather than gusset-type construction.*

GLASSINE WITH THERMOPLASTIC COATING — *Tests equal to any other of its type, better than many.*

DUPLEX BAGS in any combination of materials for any purpose— *Definitely the best obtainable.*

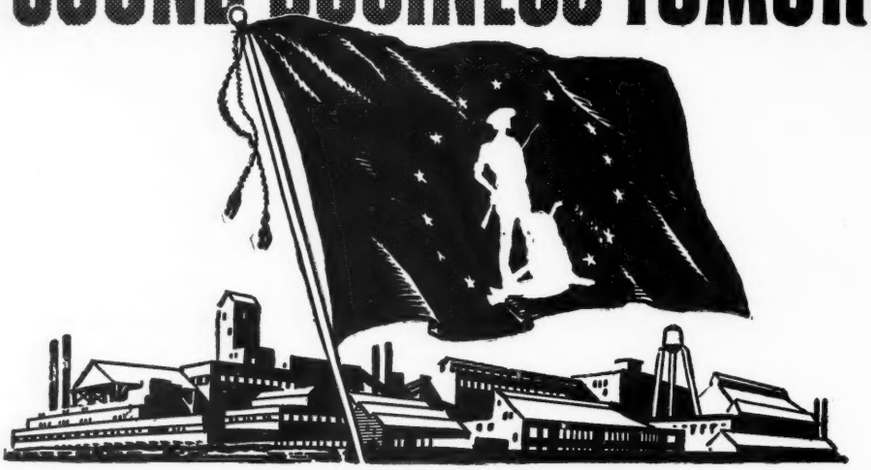
PACKAGES WITH THERMOPLASTIC LIP — *Economical. Tamperproof. Properties adequate for many uses.*

Packaging Division E. W. TWITCHELL Inc.

Public Ledger Bldg., Philadelphia, Pa.

Specialist in Special-Purpose Paper Packagings

FOR VICTORY TODAY AND SOUND BUSINESS TOMORROW



Get This Flag Flying Now!

This War Savings Flag which flies today over companies, large and small, all across the land means *business.* It means, first, that 10% of the company's gross pay roll is being invested in War Bonds by the workers voluntarily.

It also means that the employees of all these companies are doing their part for Victory . . . by helping to buy the guns, tanks, and planes that America and her allies *must* have to win.

It means that billions of dollars are being diverted from "bidding" for the constantly shrinking stock of goods available, thus putting a brake on inflation. And it means that billions of dollars will be held in readiness for post-war readjustment.

Think what 10% of the national income, saved in War Bonds now, month after month, can buy when the war ends!

For Victory today . . . and prosperity *tomorrow,* keep the War Bond Pay-roll Savings Plan rolling in *your* firm. Get that flag flying now! Your State War Savings Staff Administrator will gladly explain how you may do so.

If your firm has not already installed the Pay-roll Savings Plan, *now is the time to do so.* For full details, plus samples of result-getting literature and promotional helps, write or wire: War Savings Staff, Section F, Treasury Department, 709 Twelfth Street NW., Washington, D. C.

EVERYBODY EVERY PAYDAY AT LEAST 10%

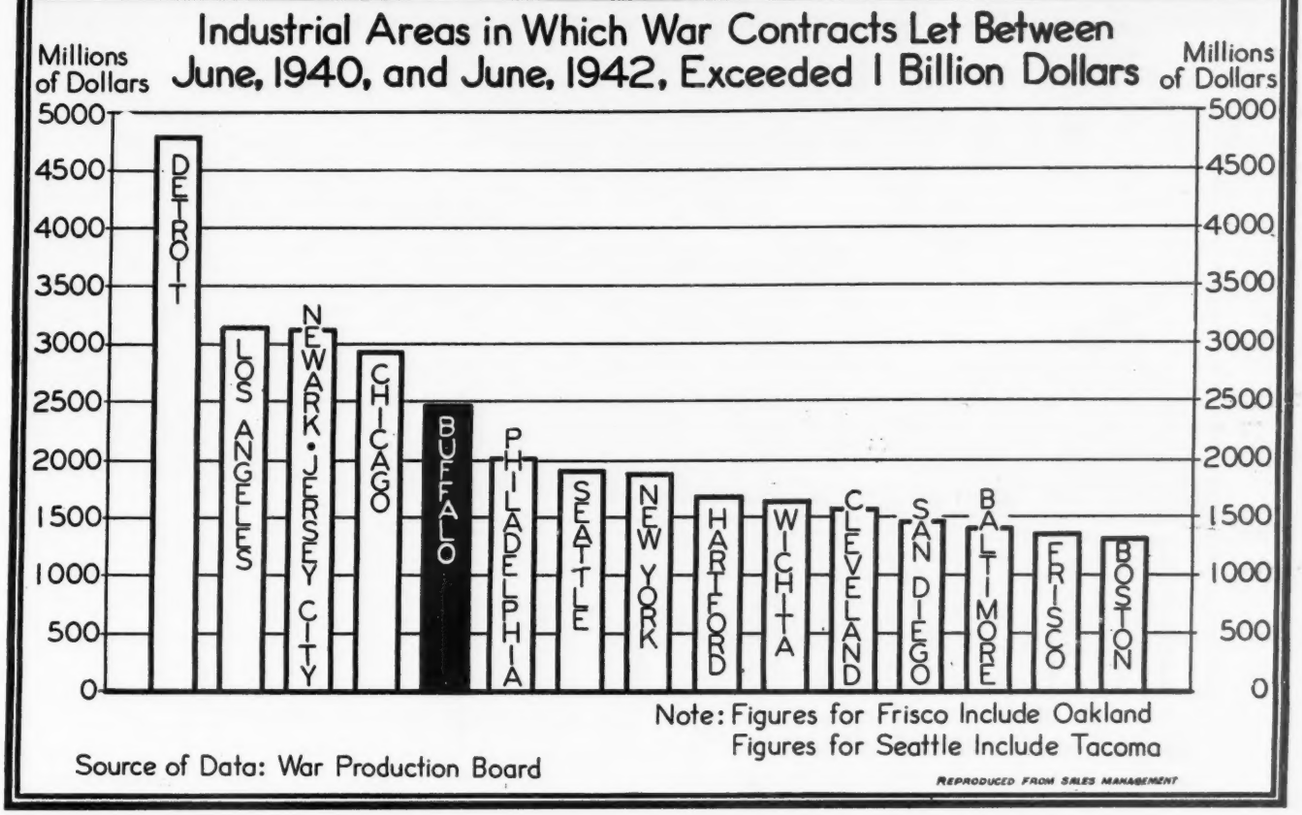
Save With

War Savings Bonds

This Space Is a Contribution to America's All-Out War Program by

FOOD INDUSTRIES

BILLION DOLLAR WAR CONTRACT CITIES



Buffalo is No. 1 U. S. Market

Among Industrial Areas of 750,000 or More Population

In primary War Contracts awarded to June, 1942—Buffalo ranks 5th among all cities that have received over $1,000,000,000 in War Contracts . . . but in relation to the size of the area—Buffalo is first . . . with nearly 2½ billion dollars—or $2,572 for every man, woman and child in the district.

Buffalo Gains Steady and Substantial

★ **Factory Payrolls are now indexed at 340**

★ **Factory Employment is now indexed at 204**

★ **Average Weekly Earnings Have Increased from $27.05 to $45.23—or 67.2%**

Using as a base the averages of the years 1935-1939 = 100

There has been no wild influx of population . . . perhaps a gain of not over 10% . . . so more people per family are employed, resulting in far greater family unit income than is shown by the increase in average weekly earnings by individuals. *Increases in family incomes are far more important than increases in individual incomes.*

NOTE ON CHAINS: Evidence of the importance of the Courier-Express to food chains are the expanded advertising programs the major chains—A & P, Loblaw's, New-Way and Mohican—are currently using in this newspaper.

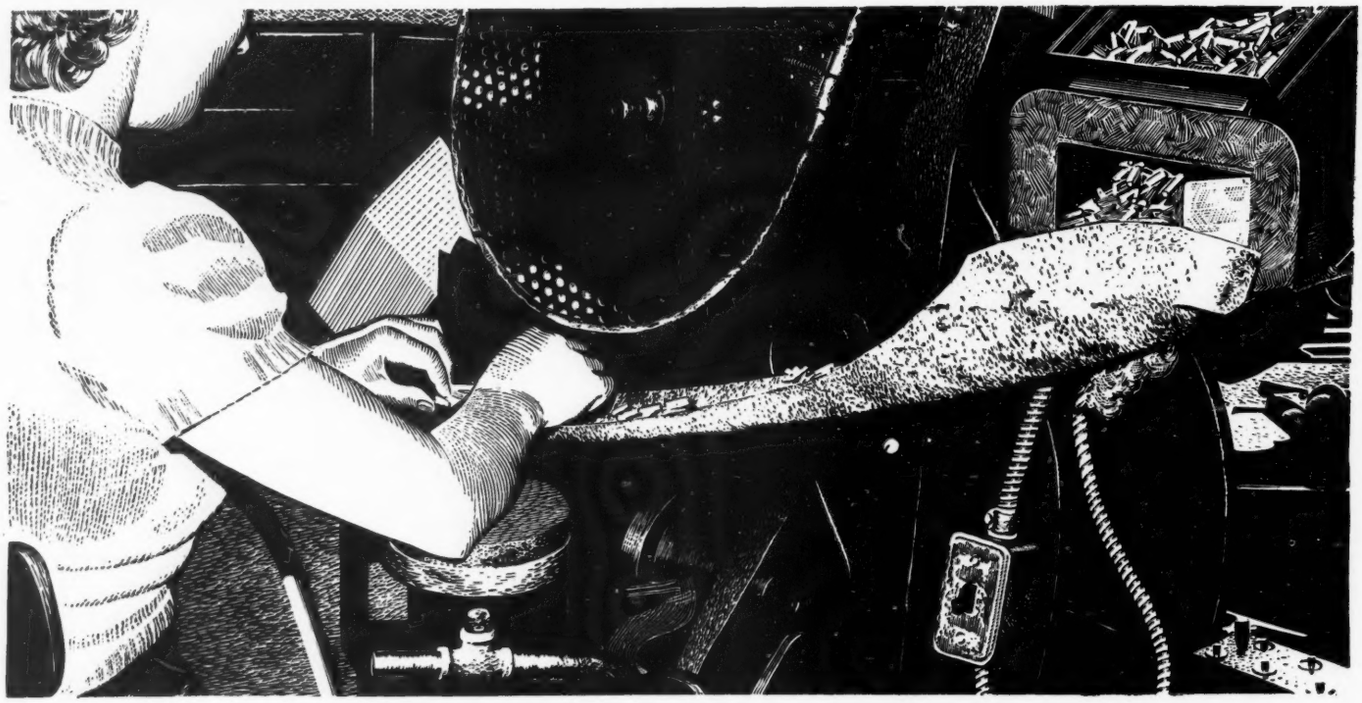
The Flow of Merchandise

The Courier-Express has available very exhaustive studies to use as a guide to reach and adequately influence this tremendous amount of potential buying power.

It is important to know the speed of the current in steering your merchandise craft through this important area.

The Buffalo

Courier-Express



How Sally used up a copper mine

LOOK at the picture carefully. See that elbow-rest under Sally's arm?

It is significant. In fact, it's a humble sermon on war production.

Understand the existence of that arm-rest and you understand one of the basic reasons why, in less than seven months after war-conversion, American industry is hollering for Washington to provide more copper and other basic raw materials.

► Before Sally got her arm-rest, she reached over to a box, picked up a tiny part for an airplane instrument and placed it in the machine . . . Now the supply box is tilted and constantly jiggled, so that the parts flow to her finger-tips. With each motion Sally saves a fraction of an ounce of energy and half a second of time.

Without such tiny savings of time and effort, America's 20,000,000 factory workers would be hopelessly handicapped in their race against the millions at work with a head-start of years in Germany, Japan and Italy.

► The muscle-misers and second-savers of our factories come in handy in this war, when splitting seconds in production is as important as it is in battle.

Who are the men that provide the arm-rests, jiggle the supply-boxes, conduct the ceaseless hunt for wasted half-seconds and needless human motion?

► They are the "methods" men of industry. They have all sorts of titles: plant managers, operations managers, methods engineers, efficiency engineers, etc. But their job is "to manage men and machines to save time and materials."

In peace, these men were the core of the industrial system that gave you the world's highest living standard at the world's lowest cost in hours of work.

► In war, these same "methods-managers," with the intelligent cooperation of American workmen, are cutting years from our arming task by splitting seconds from its millions of individual operations. This example of time-saving is just an indicator of what a plant operating man does. Such men have many other jobs, including the important job of plant maintenance, but "second-splitting" is the field in which they are the envy of the whole world.

The American Production Manager is the product of the American industrial system. Complex, loose-jointed and aimless though our system may seem to the theorist, it meets every challenge, because it is the best system ever devised by man for discovering, developing and rewarding individual initiative.

Reprints of this advertisement are available in handy booklet form.

McGRAW-HILL PUBLISHING COMPANY, Inc.

330 WEST 42ND STREET . . NEW YORK

SALLY—

IS UP YOUR ALLEY!

WASHINGTON, and other large city newspapers were used for the advertisement shown opposite, because government and public need to understand the asset which America has in its trained industrial staffs.

Read what we said about "methods management" in the advertisement, then ask yourself the secret of American genius for production economies in men, materials and time.

One big advantage we have in this country is the interchange of know-how between industries. If an instrument maker reduces a fourth-class hand motion to third-class, all other managers of small part assembly can, and do, find out how it was done.

By means of the articles and advertisements in FACTORY,* a plant operations magazine, tens of thousands of plant operating men keep abreast of each new development in equipment and technique.

The magazines of the McGraw-Hill Network of Industrial Communication exist solely for swapping ideas. They are backed by the editors and engineer-correspondents, who gather information wherever it is developed, and funnel it out to the fields where it is needed.

So valuable is this interchange of technical information that many companies are surveying their organizations to make sure that the supply of Industrial Magazines is adequate.

If you would like suggestions as to how to conduct such a survey, just write to Reading Counselor Department, McGraw-Hill Publishing Company, Inc., 330 West 42nd Street, New York.

★ ★ ★

THE McGRAW-HILL NETWORK

23 publications, which gather "war-news" from the "war-production-front" through a staff of 153 editors and 725 engineer-correspondents . . . More than 1,500,000 executives, designers, production men and distributors use the editorial and advertising pages of these magazines to exchange ideas on war-production problems.

THE McGRAW-HILL BOOKS

Publishers of technical, engineering and business books for colleges, schools, and for business and industrial use.

McGRAW-HILL PUBLISHING COMPANY, Inc.
330 WEST 42nd STREET • NEW YORK

THE McGRAW-HILL NETWORK OF INDUSTRIAL COMMUNICATION:

*Factory Management & Maintenance—*SHOWS HOW TO MANAGE MEN AND MACHINES TO SAVE TIME AND MATERIALS*

American Machinist
Aviation
Bus Transportation
Business Week
Chemical & Metallurgical Engineering
Coal Age
Construction Methods
Electrical Contracting
Electrical Merchandising
Electrical West
Electrical World
Electronics
Engineering & Mining Journal
E. & M. J. Metal and Mineral Markets
Engineering News-Record
Food Industries
Mill Supplies
Power
Product Engineering
Textile World
Transit Journal
Wholesaler's Salesman

ALSO AFFILIATED WITH BUSINESS PUBLISHERS INTERNATIONAL CORPORATION, PUBLISHERS OF BUSINESS AND TECHNICAL MAGAZINES FOR OVERSEAS CIRCULATION

Available for 24-Hour Duty at Your Plant

the HTH "Sanitation Squad"

● Today packers and manufacturers of food products—dairies, meat packers and other important producers—are more careful than ever to prevent spoilage losses. The plain truth of the matter is that bacterial contamination hurts the war effort by detracting from the sum total of food production.

You can guard against this invisible menace in your plant with HTH products —HTH, HTH-15 and Lo-Bax. They are full-strength chlorine sterilizers in convenient dry form. When added to water, they form dependable, fast-killing hypochlorite solutions that make short work of bacteria. What's more, HTH Products not only minimize spoilage losses . . . but they safeguard the purity and quality of your food products. And they're as economical as they are effective. You can use them freely to flush, spray or wipe all surfaces with which food and beverages come in contact; also for general sanitation throughout the plant.

HTH Hypochlorite solutions are an effective germicide for use on floors, in locker rooms and cafeterias.

HTH PRODUCTS

THE MATHIESON ALKALI WORKS (INC.) 60 EAST 42ND STREET, NEW YORK, N. Y.

HTH PRODUCTS (HTH, HTH-15 and LO-BAX) . . . NUFOS . . . DRY ICE . . . CARBONIC GAS . . . CAUSTIC SODA . . . AMMONIA, ANHYDROUS and AQUA . . . SODA ASH . . . BICARBONATE OF SODA . . . LIQUID CHLORINE . . . BLEACHING POWDER . . . PH-PLUS . . . SYNTHETIC SALT CAKE . . . SODIUM CHLORITE PRODUCTS

PROFESSIONAL SERVICES

LANCASTER, ALLWINE & ROMMEL
Interesting booklet concerning Inventions, Patents, Trade-Marks and Copyrights, together with schedule of Government and Attorney's Fees, sent without obligation. Simply ask for "booklet and schedule."
Established 1915
Patents & Trade-Marks
Suite 457, 815—15th St., N.W., Washington, D. C.

SCHWARZ LABORATORIES
INC.
BIOLOGICAL & CHEMICAL RESEARCH of FOODS and BEVERAGES
●
VITAMIN DETERMINATIONS
202 East 44th St. New York, N. Y.

FOSTER D. SNELL, INC.
Our chemical, bacteriological, engineering and medical staff with completely equipped laboratories are prepared to render you Every Form of Chemical Service
Ask for copy of Bulletin 3W
302 Washington St. Brooklyn, N. Y.

FOR profit sales in the great food field, for advertising that gives you direct mail precision with *publication economy* place FOOD INDUSTRIES on your schedule today.

FOOD INDUSTRIES
ABC A McGraw-Hill Publication ABP
330 W. 42nd St., N. Y.

Team Up for Victory

"CONSOLIDATED"

For Rush Delivery of Equipment

1—Pneumatic Scale Packaging Unit.
1—Pneumatic Scale Automatic Wax Liners.
7—300 gal. Copper closed tin-coated Tanks.
1—J. H. Day #2 Brighton Mixer, 80 gal. cap.
6—8 to 40 gal. Pony Mixers.
15—Dry Powder Mixers, from 50 to 4000 lbs.
1—Stokes & Smith auger type automatic Powder Filler.
2—80-qt. Century 4-speed Mixers, m.d.
1—Buffalo 48"x40" Bronze Rotary Vacuum Drum Dryer.
1—26"x60" double drum Dryer, comp.
3—Buffalo 17-shelf Vac. Shelf Dryers, 42x42".
1—Buffalo 24" Vanilla Bean Chopper.
1—Burt Straight Line Labeler, m.d.
1—World 1-Ermold semi-auto. Labeling Machine.
2—Karl Kiefer Visco Filling Machines.
1—Johnson mod. JA Cellophane Wrapper.
11—Filter Presses P & F; Recessed; to 42" Square
2—World Rotary Automatic Labeling Machines.
2—Mechanical 4x9' Lard Rolls, m.d.
1—#6 Sweetland Filter, 12 bronze leaves, 3" c.c.
17—Nickel, Stainless Steel, Copper, Aluminum; Glass Lined; Kettles and Vacuum Pans, up to 550 gal. cap.
2—Schultz-O'Neil Pulverizers.
1—54"x45" Monel Lined Direct Heat Dryer.
3—K.K. & U.S. Rotary bottle Rinsers, m.d.
2—Premier 5" and 10" Colloid Mills, m.d.
1—5x35' Louisville Steam Tube Dryer.
1—Elgin 12-spout Rotary Piston Filler, S.S.

• *Send for "Consolidated News" listing complete stock.*

We buy and sell from a Single Item to a Complete Plant

CONSOLIDATED PRODUCTS CO., Inc.

Office: 13-17 PARK ROW, N. Y. Shops: 335 DOREMUS AVE., NEWARK

Buy With Confidence — "Consolidated"

MIXER and SIFTER

FOR SALE Model "A"—Day Mixer and Sifter complete with electric motor. Very little used; in excellent condition; price $150. Serial No. 36196.

NEDLOG FOUNTAIN PRODUCTS CO.
3224-6 North Elston Ave. Chicago, Illinois

STEEL PANS

40 Stainless 20 Gauge Steel Pans, steam jacketed; 96" x 39⅞" x 1½" deep, divided 8-12" sections. $100 each.

FS-627, Food Industries
330 West 42nd St., New York City

LABELLING MACHINES FOR SALE!

1—Standard National O & J semi-automatic bottle labeler with change parts for catsup bottles. 1—Ermold semi-automatic bottle labeler with catsup bottle change parts. 1—Ermold semi-automatic bottle labeler, partially stripped.

FS-629, Food Industries
330 West 42nd St., New York City

WANTED

Crown Cork & Seal Crowner, Model D or E in good condition. Price open.

W-628, Food Industries
330 West 42nd St., New York City

WANTED

NAILING MACHINES

Two or three nailing machines, four-funnel size. Must be in good working condition. Write C. A. Colombi,

CHEF BOY-AR-DEE QUALITY FOODS, INC.
Milton, Pennsylvania

ROTARY DRIERS WANTED

Large distiller wants three 4' or 5' diameter x 25' to 30' long rotary steam tube driers and press. Louisville preferred. Give full particulars first letter.

W-636, Food Industries
330 West 42nd St., New York City

For Sale

CREAMERY and PRODUCE PLANT

In Midwest Rail Center

Contains 122500 cu. ft. Freezer and CoolerSpace and 40,000 sq. ft. of Storage and Operating Space

Fully Equipped and in Operation

BO-635, Food Industries
520 No. Michigan Ave., Chicago, Ill.

WANTED

2—Dry Powder Mixers, with or without Sifters. 2—Rotex Screens; 1—Packaging Machine; 1—Glass Lined Kettle; Stainless Steel, Monel, Copper or Aluminum Jacketed Kettle and Vacuum Pan. 2—Tablet Machines; 3—Filters.

W-637, Food Industries
330 West 42nd St., New York City

WANTED

Used or New CARTON FEEDER AND BOTTOM SEALER—any make.

M. J. B. Co.
665 Third Street San Francisco

SEARCHLIGHT SECTION

(Classified Advertising)

Employment and Business "OPPORTUNITIES" Equipment, Used or Resale

UNDISPLAYED RATE

10 CENTS A WORD. MINIMUM CHARGE $2.00.

Positions Wanted (full or part time, salaried employment only), ½ above rates, payable in advance.

Box Numbers—Care of publication New York, Chicago or San Francisco offices count as 10 words. Replies forwarded without charge.

Discount of 10% if full payment is made in advance for 4 consecutive insertions.

DISPLAYED RATE

Individual Spaces with border rules for prominent display.

The advertising rate $6.00 per inch. Contract rates on request.

An advertising inch is measured ⅞" vertically on one column, 3 columns—30 inches—to a page.

Copy for new advertisements received until the 18th of the month for the issue out the following month subject to space limitations.

POSITIONS VACANT

WANTED—EFFICIENCY MAN with production experience, capable of handling large Food Manufacturing Plant. State experience and salary requested in detail. P-632, Food Industries, 330 W. 42nd St., New York, N. Y.

DAIRY LABORATORY TECHNICIAN, preferably experienced, with academic training in dairy manufactures, bacteriology and chemistry. Send full details as to education, experience, draft status and salary desired to N. J. Dairy Labs., 226 Easton Avenue, New Brunswick, N. J.

POSITIONS WANTED

FLAVOR CHEMIST. 20 years practical, with thorough knowledge of flavor stabilizing, anti-oxidants, formula developing and technical supervision of production, desires position with food, extract or beverage manufacturer. PW-633, Food Industries, 520 N. Michigan Ave., Chicago, Ill.

FOOD TECHNOLOGIST—Wishes lasting connection. Is 45 years of age, has a B.Sc. degree and has had 18 years experience up to production manager in the canned foods industry. Knows well the preparation and the canning of vegetables, fruits, and specialty items, both in tin and in glass. Is an experienced personnel man, knows equipment, and has some knowledge of food dehydration. Is now free to accept work. Will start for $5000 per year. PW-631, Food Industries, 330 W. 42nd St., New York, N. Y.

FOR SALE

ONE Automatic Cellopane Wrapping Machine for one pound coffee cartons. The Brundage Brothers Company, Toledo, Ohio.

WANTED

LABORATORY SIZE stainless steel evaporator about sixteen inches diameter by four feet high. W-630, Food Industries, 520 N. Michigan Ave., Chicago, Ill.

For Sale

COMPLETE VEGETABLE DEHYDRATING PLANT

ALL MODERN EQUIPMENT

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2—Hallier 18-spout Automatic
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2—CC&S Jumbo Model D 7-Head Automatic
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1—Kendall Jr. Single-Head Automatic
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2—Adriance 804A Semi-Automatic
1—Modern Bond Semi-Automatic

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1—Meyer Dumore Qt. 8-wide, 1-cmpt.
1—Meyer Dumore Pt. 8-wide, 3-cmpt.
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1—Liquid Superkleen Qt. 8-wide, 3-cmpt. (2 floor)
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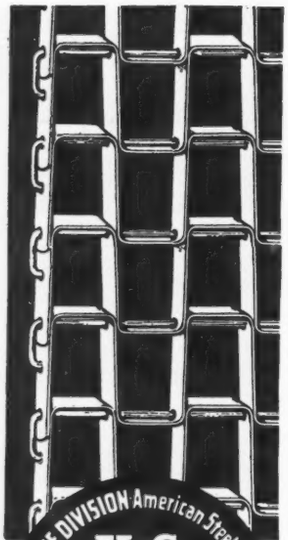

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UNITED STATES STEEL

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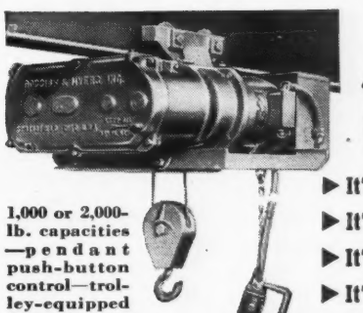

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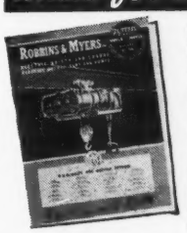

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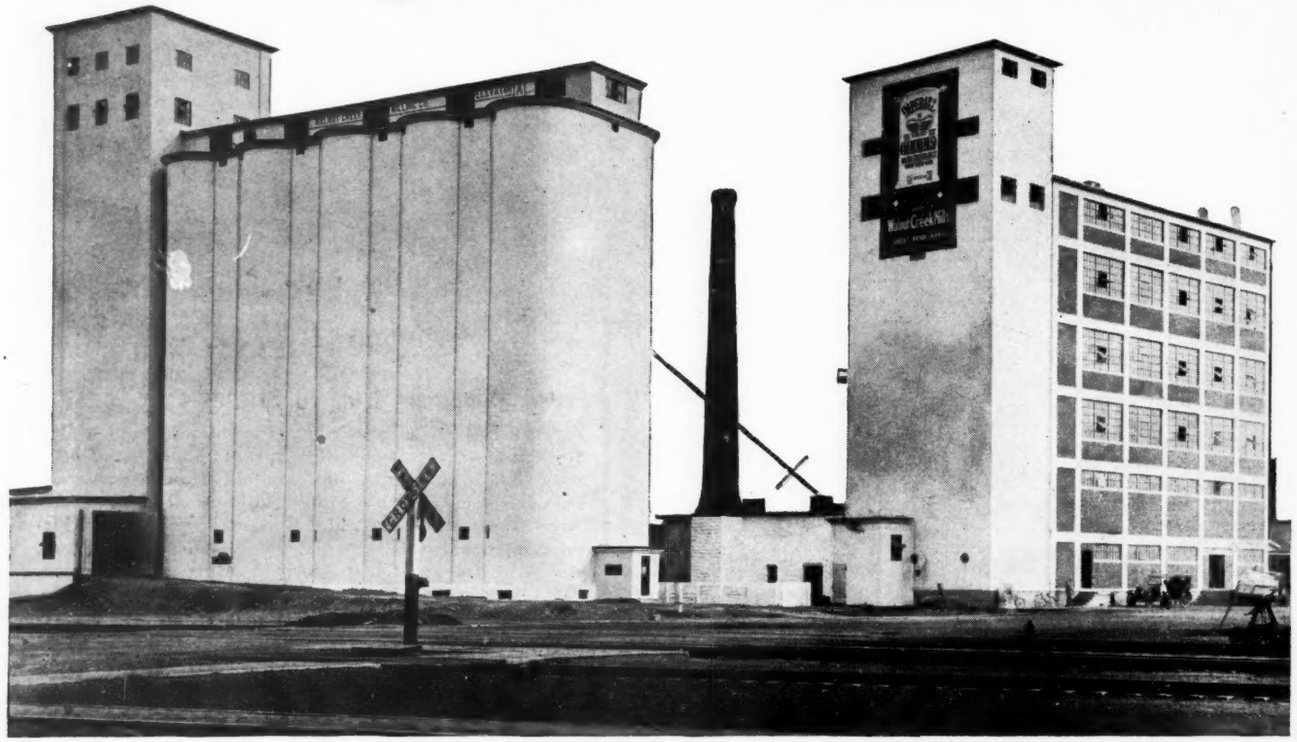

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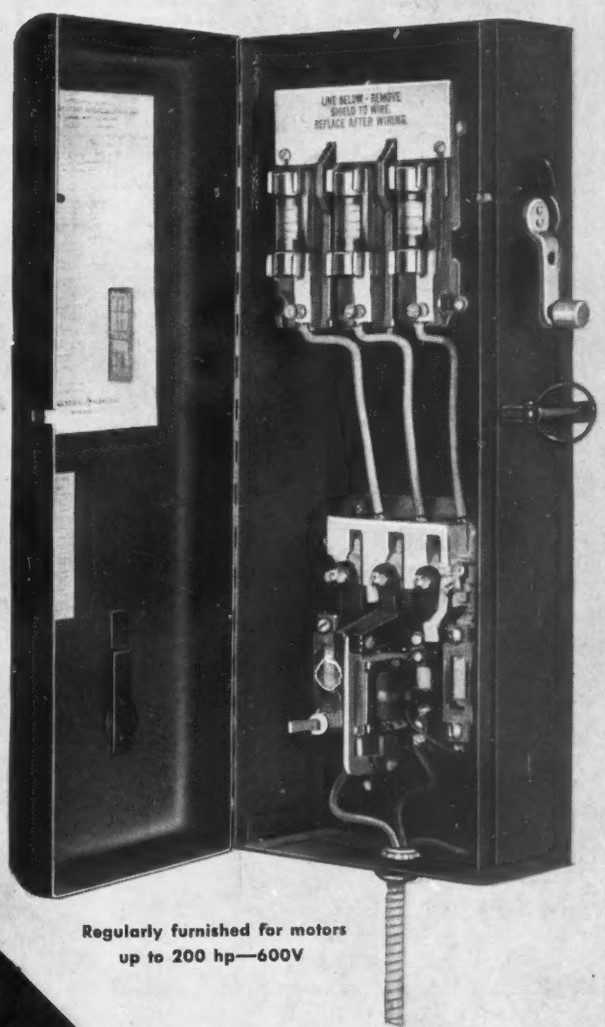

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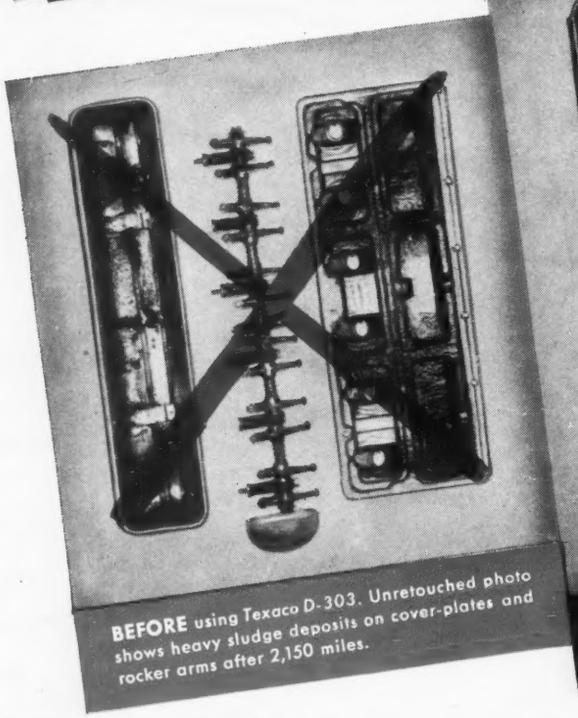
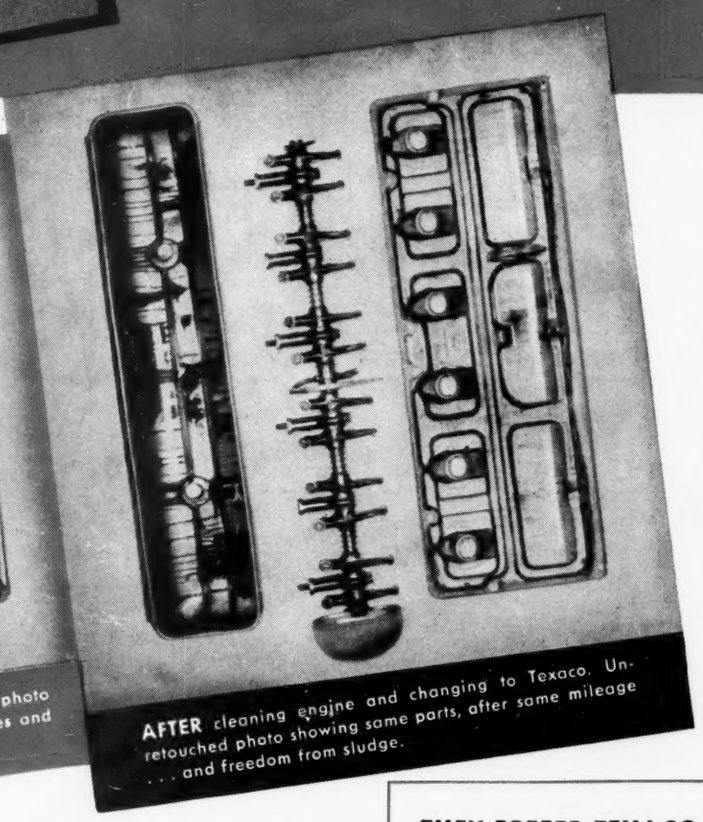
GENERAL ELECTRIC

PHOTOGRAPHIC PROOF THAT ENGINES STAY 3 TIMES CLEANER



BEFORE using Texaco D-303. Unretouched photo shows heavy sludge deposits on cover-plates and rocker arms after 2,150 miles.



AFTER cleaning engine and changing to Texaco. Unretouched photo showing same parts, after same mileage . . . and freedom from sludge.

AS THE larger unretouched photo shows, engines can be kept clean . . . assuring full power and maximum fuel economy . . . when lubricated with *Texaco D-303 Motor Oil.*

The exclusive use of *D-303* keeps both Diesel and gasoline engine pistons, rings, valves and other parts 3 TIMES CLEANER than ordinary lubricating oils . . . by holding fuel soot and other deposit-forming materials in suspension so that they are drained away at regular oil-change periods.

Using *D-303,* oil lines and filters also stay clean; modern bearings are protected in the heaviest service.

The outstanding performance that has made Texaco preferred in the fields listed in the panel has made it preferred by heavy-duty truck operators everywhere.

These Texaco users enjoy many benefits that can also be yours. A Texaco Automotive Engineer will gladly cooperate . . . just phone the nearest of more than 2300 Texaco distributing points in the 48 States, or write:

☆ ☆ ☆

The Texas Company, 135 East 42nd Street, New York, N. Y.

THEY PREFER TEXACO

★ More revenue airline miles in the U. S. are flown with Texaco than with any other brand.

★ More buses, more bus lines and more bus-miles are lubricated with Texaco than with any other brand.

★ More stationary Diesel horsepower in the U. S. is lubricated with Texaco than with any other brand.

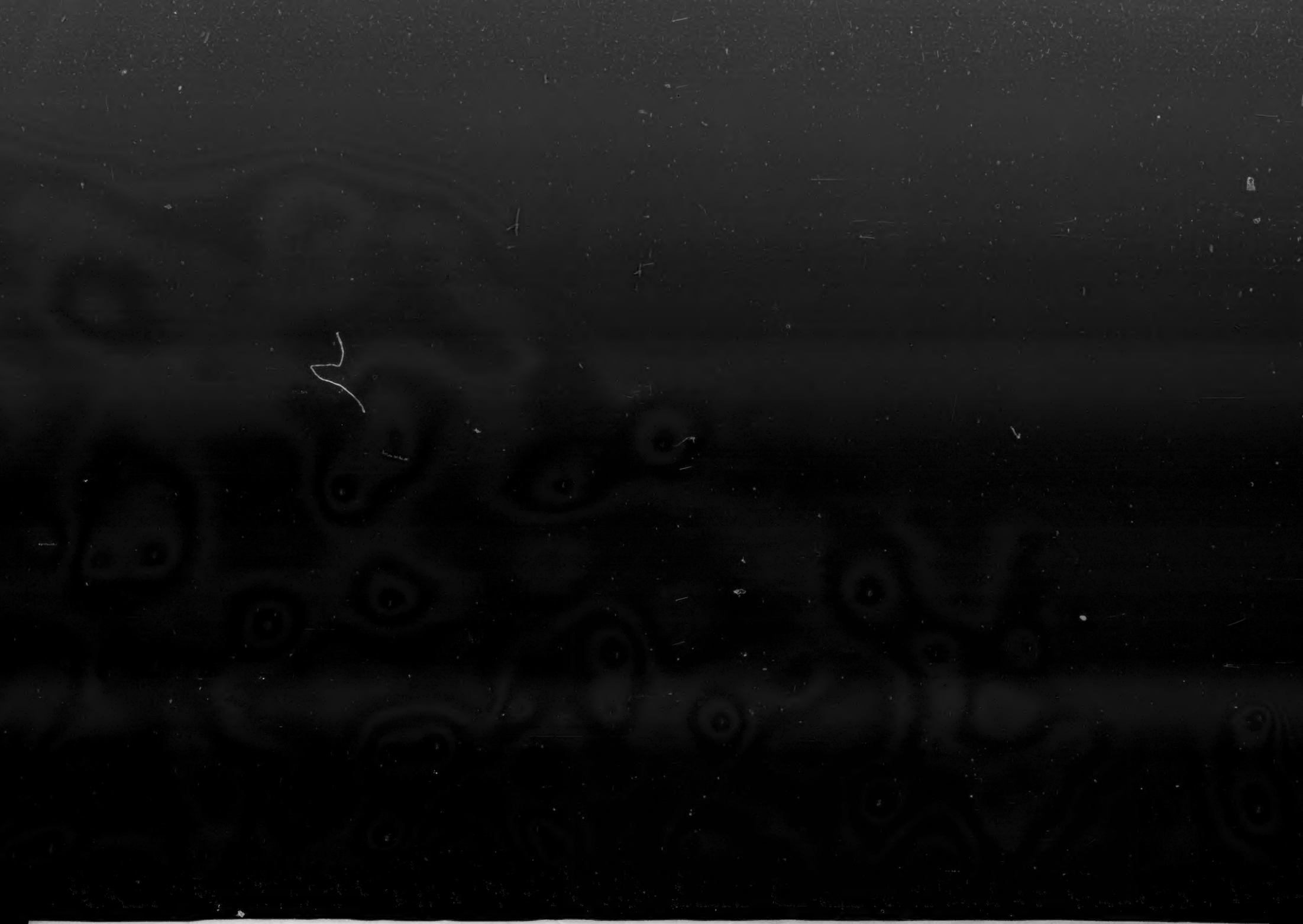
★ More Diesel horsepower on streamlined trains in the U. S. is lubricated with Texaco than with all other brands combined.

★ More locomotives and cars in the U. S. are lubricated with Texaco than with any other brand.

TUNE IN FRED ALLEN EVERY SUNDAY NIGHT—CBS

TEXACO REG. T.M.

TEXACO Lubricants and Fuels

FOR ALL TRUCKING EQUIPMENT

HELP WIN THE WAR BY RETURNING EMPTY DRUMS PROMPTLY